Chapter 4

STRUCTURAL CHANGE AND COMPETITION IN THE SIERRA LEONE BANKING SECTOR: AN EMPIRICAL INVESTIGATION

By Olufemi Sallyanne Decker

4.1 Introduction

Sierra Leone's 2009 Financial Sector Development Plan explicitly states that there is a need to develop a competitive and efficient financial sector to promote private sector development, accelerate economic growth and reduce poverty.[1] The importance of financial development in achieving economic development goals is well researched in the academic literature and forms the cornerstone of policy prescriptions for financial sector reforms (see, for example, Levine 1997; Levine *et al.* 2000; Honohan and Beck 2009; Beck *et al.* 2011).[2] In the context of the IMF's financial sector assessment efforts and national poverty reduction strategies, increased attention is being paid to the role of banking structure and competition in financial sector development. Beck *et al.* (2011, p. 5) see competition as 'the most important driver of financial innovation that will help African financial systems deepen and broaden'. There is a concern that uncompetitive banking markets cause banks to provide inadequate services and realize excessive profits.

The World Bank (2005, p. 18) defines competition in the financial system as 'the extent to which financial markets are contestable and the extent to which consumers can choose a wide range of financial services from a variety of providers'. A contestable market is one in which real or perceived entry and

[1] This builds on the recommendations of the 2006 Financial Sector Assessment Programme report. The four priority areas of the 2009 Financial Sector Development Plan are the strength and competitiveness of the banking sector, access to finance, mobilization and investment of funds and regulatory and legislative reforms for development, stability and capacity building.

[2] Kargbo and Adamu (2009) recently found a positive link between financial sector development and economic growth in the case of Sierra Leone.

exit barriers do not exist and the threat of entry is sufficient to force firms in an industry to behave as if it were competitive.[3] Llewellyn and Weyman Jones (2010) distinguish between traditional notions of competition and effective competition. Whereas traditional views and measures of competition focus largely on the numbers of competitors, effective competition occurs in an environment that is open and transparent and in which consumers have access to information needed to make rational choices at low transactions costs.

Competition in banking is considered beneficial for a number of reasons. Sinclair (2000) states that competition in banking should accelerate long-run growth by narrowing the spread between lending and borrowing interest rates and by limiting collusive and restrictive practices. As in any other market, increased banking competition can promote economic growth through improved cost efficiency, welfare gains from lower prices and better services for consumers, innovation and a greater variety of products (Cetorelli 2001a; Northcott 2004; Claessens 2009; Pruteanu-Podpiera *et al.* 2008; Schaek and Cihak 2008; Bikker and Spierdijk 2009). Increasing competition among banks can also widen access to all potential clients and so promote financial inclusion and social equality (Demirgüc-Kunt *et al.* 2008).

Bank credit plays an essential role in financing the production of goods and services. Competition in the banking sector can impact on private sector development because of how it affects industrial firms' access to external financing. Petersen and Rajan (1995), Vives (2001), Cetorelli (2001b) and Mitchener and Wheelock (2010) have found that where industries depend on external financing, concentration in the banking sector can enhance the growth of the industrial sector. One explanation for this is that concentration and market power increase availability of bank credit to firms by providing incentives for banks to establish relationships with their customers. Alternatively, Beck *et al.* (2004) found that concentration is associated with financing obstacles for small, medium and large firms. Similarly, Claessens and Laeven (2005) concluded that greater competition allows financially dependent industries to grow faster.

Like most African economies, Sierra Leone's rudimentary financial system is dominated by banks. However, there has been no study of competitive conditions in the Sierra Leone banking sector. Indeed, few studies have directly estimated the level of competition in African banking markets. Kasekende *et al.* (2009) have noted that reliable measurement and monitoring of competitive conditions pose significant challenges for African policymakers and that these shortcomings must be addressed to reform banking and capital markets effectively. A sound understanding of the impact of changes in banking market structure on competition and reliable and transparent measurement of competition in banking is needed to inform both microprudential and

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[3] The characteristics of a contestable market lead to a market in which potential competition becomes as powerful as actual competition. Competitive behaviour and pricing can be observed even if there may be only one firm serving the market. Inefficient firms whose production costs are higher than those of potential entrants are forced to leave the industry.

macroprudential regulation, banking supervision, banking competition policy and monetary policy.

Sierra Leone's banking sector presents a unique opportunity to study banking competition in the context of postwar financial reconstruction. This is because conflict exacerbates many of the informational limitations of developing countries' banking systems that can act as impediments to banking competition. The damage and destruction that accompany war worsen information asymmetry and can distort financial intermediation because of loss of capital, personnel, property, records and uncertainties in collateral (Addison *et al.* 2001a,b; Bikker and Spierdijk 2009).

Postwar structural changes, such as rapid foreign bank entry, provide an added impetus to explore competitive conditions in Sierra Leone banking. The Bank of Sierra Leone and the International Monetary Fund have both commented on these changes. In spite of concerns that there are too many banks relative to the size of the market, the level of intermediation remains low, which may indicate limited competition.[4] Excessive competition can create instability in the banking sector and have a negative impact on some customers, especially those at risk of being financially excluded. Limited competition leads to inefficiency and the exercise of market power.

This study adopts an industrial economics approach and a unique bank-level panel data set on the Sierra Leone banking system to study structural change and competitive conditions over the period 2001–10.[5] The notion of structural change embraces alterations to the conventional elements of market structure, such as size distribution, numbers and comparative significance of banks within the financial system and in the mechanisms by which financial intermediation takes place within the financial system (Llewellyn 1990; Gardener 1992). Ultimately, changes in industry structure alter the competitive environment within which firms operate and their strategies for profit maximization. Competition studies are undertaken to determine whether players in a market are able to exercise market power and raise prices above marginal costs.

The contribution of the chapter is threefold. First, trends and patterns in key structural developments are examined to highlight drivers of change and the implications of these for competition and effective financial intermediation. Second, by evaluating competitive conditions in Sierra Leone using both structural competition measures and the Panzar–Rosse approach, the study

[4] The Bank of Sierra Leone (2009) has expressed concern that, given the relatively small size of the market, there may be too many banks operating the sector. On the other hand, the IMF has suggested that the low level of intermediation in Sierra Leone may be indicative of limited competition in the sector (IMF 2010).

[5] Industrial economics is concerned primarily with the relationship between market structure, firm conduct and performance as well as the nature of the competitive process in markets. Revell (1987, p. 1) clearly states the case for studying banking sectors within an industrial economics framework. 'Banking is like any other industry in having an economic structure … and … there is a branch of applied economics that can be called the industrial economics of banking.'

adds to the small but growing body of literature on the industrial organization of banking in African economies. Third, lessons and policy considerations for policymakers are outlined.

This chapter is organized as follows. Section 4.2 analyses key structural changes in the sector since 2001. Section 4.3 outlines the Panzar–Rosse methodology used in the econometric analysis of competitive conditions in Sierra Leone banking for the period 2001–10 and summarizes previous African studies that have used the methodology. The empirical results are presented in Section 4.4. Section 4.5 considers the policy implications of the findings and Section 4.6 concludes.

4.2 Structural Change in Sierra Leone Banking 2001–10

Sierra Leone's protracted civil war disrupted the banking sector in a fundamental way, leaving widespread damage to the branch network and banking infrastructure as well as financial loss and loss of customer goodwill and confidence.[6] To provide the foundations for developing and strengthening the financial system, new regulations and legislation were introduced in the immediate aftermath of the war. The Bank of Sierra Leone Act 2000 updated and clarified the functions of the Bank of Sierra Leone, including matters relating to developing and promoting an efficient banking and financial system in Sierra Leone. It also brought the legislation in line with other central bank legislations in West Africa and emphasized the Bank of Sierra Leone's price stability objective. The Other Financial Institutions Act (2001) widened the supervisory remit of the Bank of Sierra Leone to include any institution engaged in financial activity.

The Banking Act and the Banking Regulations of 2001 and 2003 saw the introduction and implementation of prudential standards and measures relating to capital adequacy, provisioning and a move towards embracing international norms. In line with the Basel Accord, the regulations adopted a minimum risk weighted capital requirement which was set at 15%. Other areas covered included bank licensing, minimum paid-up capital, local assets ratio, connected lending and foreign exchange exposure. In an additional bid to strengthen prudential regulation, steps were also taken to comply with the Basel Principles for Effective Supervision.[7] Kargbo (2010) suggests that one of the reasons why the legislation was reviewed was to facilitate adequate licensing of new banks entering the Sierra Leone banking sector. Since 2001, there have been several increases in the minimum paid-up capital. The Banking Act 2000 set the minimum capital requirement at Le 800 million for domestic banks and at Le 1.6 billion for foreign banks. In 2005, the minimum capital requirement

[6] A notable casualty was Barclays Bank SL Limited Barclays had operated in Sierra Leone since 1917 but ceased operations in 1999 by selling its share to the government of Sierra Leone.

[7] See the Bank of Sierra Leone Annual Report for 2001.

TABLE 4.1. Banks operating in Sierra Leone as at 31 December 2010.

Bank	Date of establishment	Ownership
Standard Chartered Bank SL Ltd	18 March 1971*	Foreign private
Sierra Leone Commercial Bank	15 February 1973	Local public
Union Trust Bank	26 April 1995	Local private
Rokel Commercial Bank	20 September 1999	Local joint public/ private
Guaranty Trust Bank	1 February 2002	Foreign private
First International Bank	31 May 2002	Foreign private
International Commercial Bank	1 November 2004	Foreign private
Ecobank**	22 November 2006	Foreign private
Access Bank	8 November 2007	Foreign private
Skye Bank	19 August 2008	Foreign private
United Bank for Africa	21 July 2008	Foreign private
Zenith Bank	11 September 2008	Foreign private
Bank PHB	18 June 2009	Foreign private

Source: IMF country reports, Bank of Sierra Leone annual reports, bank websites.
*Established operations in Sierra Leone in 1898. **Procredit Bank, which set up operations on 1 August 2007, was taken over by Ecobank in 2010. 'Ownership' based on a controlling interest of more than 50%.

was increased to Le 15 billion for all commercial banks by 2009. At the end of 2010, the minimum capital was doubled to Le 30 billion for all commercial banks to cover a five year period effective 2014. The Bank of Sierra Leone has also adopted the CAMELS rating system in its supervision activities, as it builds up a risk based approach to supervision.[8] These regulatory changes set the backdrop for a new era in Sierra Leone banking.

The postwar period has seen growth in the banking system and an influx of foreign banks. Table 4.1 presents incorporation and ownership details of the 13 banks operating in Sierra Leone at the end of 2010. At the end of 2010, the Sierra Leone banking sector comprised 13 banks with mixed ownership. 10 banks are foreign owned. Of the 3 local banks, the government has 100% ownership of the Sierra Leone Commercial Bank and majority ownership of Rokel Commercial Bank. United Trust Bank is the only indigenous privately owned bank.

4.2.1   Number of Banks and Branching

Figure 4.1 highlights the sector's rapid transformation in terms of the number of institutions as well as the size of the branch network. The number of banks

[8] The CAMELS rating system is used by regulators and bank supervisors to determine a bank's overall condition, identify its strengths and weaknesses and provide a summary measure of a bank's overall financial condition. The six elements of the system which denote the acronym CAMELS are capital adequacy, asset quality, management, earnings, liquidity and sensitivity to market risk.
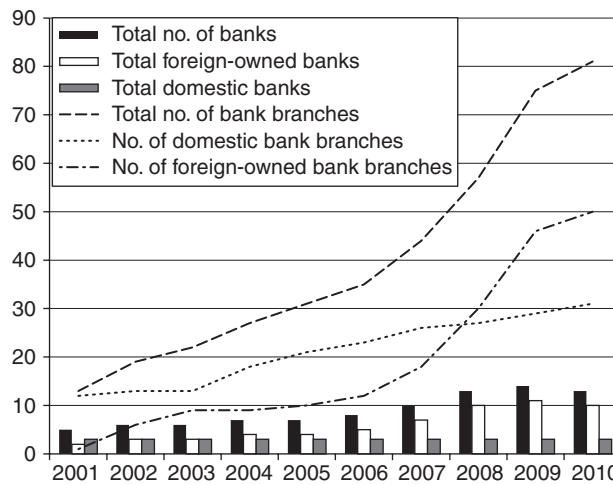
FIGURE 4.1. Numbers of banks and bank branches 2001–10.
Source: author's calculations.

almost trebled between 2001 and 2010 rising from 5 to 13, with 11 foreign
banks granted licenses in the period. The influx of foreign banks was gradual
between 1999 and 2004 but accelerated between 2007 and 2009, when 6 out
of the 11 made their entry. The regional dimension of the new entrants'
origin is a distinctive feature as 9 of them are subsidiaries of leading Nigerian
banks.[9] Accompanying the influx of new banks has been growth in and a wider
distribution of the branch network. Figure 4.1 shows a sixfold increase in the
number of bank branches from 13 in 2001 to 81 in 2010. Of the 13 bank branches
operating in 2001, 9 were located in the capital city, Freetown. By 2010, the
branch network had become more dispersed with approximately 50% located in
Freetown. Foreign bank entry has played a role in the rapidly expanding branch
network. In 2001, 92% of the network was domestically owned. By 2010, 50 of
the 81 bank branches belonged to foreign banks, with local banks accounting
for only 31 branches (38%).

This finding suggests that foreign banks may be using branching to differ-
entiate themselves and gain competitive advantage. It also emphasizes the
importance of the location of the banking firm, particularly in more rudimen-
tary circumstances where technological adaptation is low and informational
problems are more severe. These make a physical presence necessary for banks
to supply their services to customers in ways that are appropriate and suitable
for them. Proximity to customers can help banks to collect information on
their customers, develop relationships and facilitate more efficient relationship
lending, especially as foreign banks may not have the trust capital, image and
reputation that local banks enjoy. Extensive branching can also be perceived as

[9] The two exceptions are International Commercial Bank (a Malaysian Bank) and Procredit
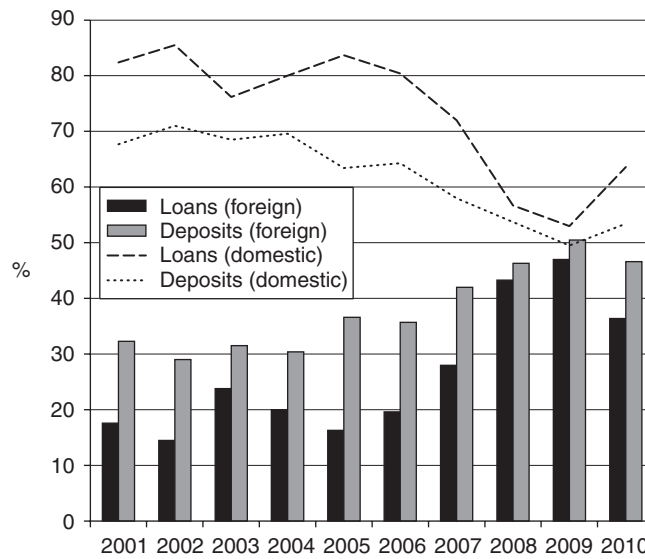Bank (a German microfinance bank).

FIGURE 4.2. Market shares of domestic and foreign banks, 2001–10.

a symbol of high-quality banking services and can be used as a unique selling point in marketing campaigns.

4.2.2 *Banking Activity and Market Shares*

Table 4.2 provides a summary of changes in key indicators of banking activity over the period. Total assets increased from Le 255 billion to Le 2.441 trillion. Between 2001 and 2010, assets grew at an average annual rate of 57.79%. The amount of loans outstanding in 2010 stood at Le 874.70 billion. The average annual growth rate for loans over the period studied was 36.92%. Total deposits in 2010 were Le 1.62 trillion. Over the period 2001–10, deposits grew at an average annual rate of 24.87%. The higher loan growth rate suggests that lending activity may have started at a much lower base than deposit collection. Also, banks may have been more aggressive and successful in making credit available, over the period, than in mobilizing deposits.

The breakdown of the market shares shown in Figure 4.2 reinforces the impact of foreign bank entry as a key dimension of structural change. At the end of 2010, local banks accounted for less than half of all banking assets, 44.6% compared to 65.2% in 2001. Government-owned local banks accounted for 37.7% of assets of the banking system. Between 2001 and 2010, foreign banks' market share of loans increased from 17.6% to 36.4%. Within the same period, foreign banks' share of deposits increased by almost 15% from 32.3% to 47%. The continuous decline, since 2005, in the domestic banks' market shares stemmed in 2010. This upturn may signal a turning point in developments in the industry.

TABLE 4.2. Summary of the Sierra Leone banking sector, 2001–10.

Classification	2001			2005			2010		
	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign
Number of banks	5	3	2	7	3	4	13	3	10
Number of branches	13	12	1	31	21	10	81	31	50
Total assets (Le billion)	255.2	166.2	89.0	670.8	427.4	243.4	2,441.6	1,088.9	1,352.7
Total deposits (Le billion)	176.4	119.3	57.1	506.8	321.3	185.5	1,625.6	868.3	757.3
Total loans (Le billion)	37.7	31	6.7	167.5	140.4	27.1	874.7	556.4	318.3
Loan/deposit ratio (%)	21	26	11.7	33	43.73	14.6	54	64	42
Loan/asset ratio (%)	14.8	18.6	7.5	25	32.8	11.1	36	51	23.5
Market share									
Assets (%)	100	65.2	34.8	100	63.7	36.3	100	44.6	55.4
Deposits (%)	100	67.7	32.3	100	63.4	36.6	100	53	47
Loans (%)	100	82.4	17.6	100	83.7	16.3	100	63.6	36.4
Revenues (Le billion)	52.1	30.9	21.2	126.1	79.8	46.3	379.6	165.7	213.9
of which: interest revenue (Le billion)	22.1	13.39	8.76	75.5	51.83	23.7	219.7	107.05	112.65
Interest revenue/total revenue (%)	42.4	4.5	41.3	59.8	65	51.2	57.8	64.6	52.7
Net income (Le billion)	26.2	12.76	13.44	48.1	27.3	20.8	84.4	53.8 (64%)	30.6 (36%)
Net interest margin (%)	7.5	7.77	7.0	9.69	10.18	8.84	7.04	8.02	6.25
Return on assets (%)	11.9	11.49	7.86	8.1	5.37	6.22	3.40	5.01	−0.98
Non-performing loans (Le billion)	12.3	11.22	1.1	50.2	40.3	9.9	153.4	99.2	54.20
Non-performing loans/gross loans (%)	32	36	16	30	29	37	18	18	17

The analysis shows that foreign banks operating in Sierra Leone have always accounted for a much greater share of deposits than of loans, controlling almost half of the deposit base in 2010. Foreign banks generally have lower market shares of loans due to informational disadvantages that they tend to face in the lending markets (Cihak and Podpiera 2005; Kablan 2010; Rashid 2011). Another reason for foreign banks' higher market shares of deposits could be that due to a perception that they offer better quality services and have a reputation for deposit safety, foreign banks can attract deposits away from local banks and so gain market share. They can also use innovative products to mobilize new deposits.[10] Faced with informational disadvantages that can make lending in the host country riskier, they may be more inclined to collect and transfer much of the finite resource base of their host countries away from the domestic banks to lend abroad. Rashid (2011) points out that such practices can reduce local banks' access to cheaper deposit funds and force them to resort to more expensive interbank funding. The main concern about the impact of foreign bank entry on lending is the possibility of cream-skimming where foreign banks lend only to the best credit risks, forcing domestic banks to make riskier loans.

The analysis presented here shows that foreign banks more than doubled their share of lending over the period. This suggests a more vigorous competition on the lending side and could also be indicative of the general growth in lending levels. Lending levels had been quite low during the war and in its immediate aftermath, due to sluggish economic activity. Analysis of the loan-to-deposit ratio shows that lending was indeed sluggish in 2001, representing only 21% of deposits. By 2010, this had more than doubled to 54%. In the 10-year period, the ratio of loans to deposits increased by 38 percentage points for domestic banks (from 26% to 64%) and by 30 percentage points for foreign banks. The quality of the lending portfolios, while still a cause for concern, has improved over the period with the ratio of non-performing loans to total loans falling from 32% to 18%.

Figure 4.3 shows that the pattern of growth in deposits and loans has been quite volatile over the years with growth of loans displaying considerable variability. After 2006, the deposit growth rate was fairly consistent at around 33%. There was very strong loan growth in 2002 and 2003 and again between 2007 and 2009. The marked increase in lending in the 2002–3 period and after 2006 corresponds with episodes of foreign bank entry. Volatility in lending does not only increase costs and undermine risk management but it also means fluctuation in the funds available for consumption and investment purposes, impacting on growth. Domestic banks are expected to be more stable in their lending because they are less likely to be affected by developments in international markets. Foreign banks, on the other hand, can transmit problems in their home markets and from their international operations to developing and emerging economies through the lending channels, resulting in more

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[10] However, in some banking markets, high switching costs can act as barriers to entry on the deposit side and local banks that have developed established relationships with depositors can have a competitive advantage.
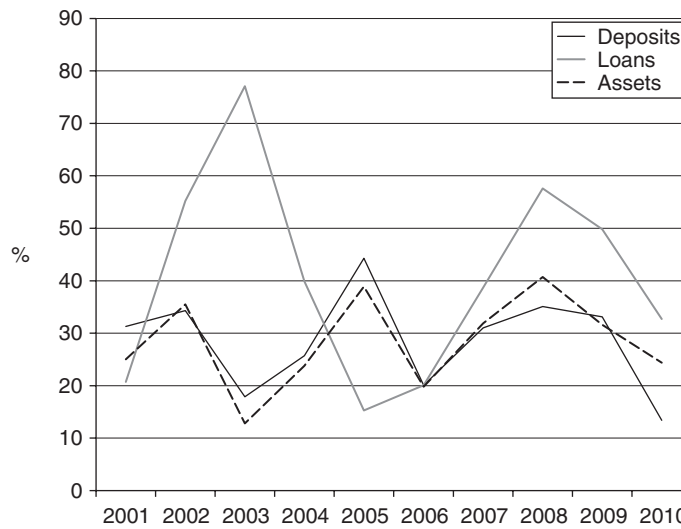
FIGURE 4.3. Year-on-year growth in assets, loans and deposits, 2001–10.
Source: author's calculations.

volatile lending patterns. While further investigation is required to determine the extent to which these fluctuations are attributable to foreign bank lending, it is perhaps not coincidental that the foreign banks' share of loans more than doubled from 17.6% to 36.4%. In 2010, although the level of deposits and loans rose overall, there was a clear slowdown in the growth rates, which may be a result of the impact of the global financial crisis.

What is emerging is a picture of intermittent periods of considerable activity, especially on the lending side. According to BSL (2009), there are observable differences between the behaviour of the incumbents, which are mainly domestic banks and the new entrants. The more established banks have not been as active as the new entrants in developing their business and enhancing their services. Furthermore, in many respects, domestic banks are at a disadvantage because of factors such as a lack of marketing expertise, bad loans, lack of institutional and financial capacity, poor financial strength and poor commitment to developing the market. These circumstances have even given rise to operational problems at, and stability concerns about, the two largest banks, Sierra Leone Commercial Bank and Rokel Commercial Bank (BSL 2009).

4.2.3   *Intermediation Efficiency, Concentration and Competition*

In 2007, there were only 160,000 accounts for a population of more than 5 million inhabitants (IMF 2009). Credit to the private sector was about 6% of GDP compared to the sub-Saharan average of 17% (IMF 2009). Demirgüç-Kunt *et al.* (2008) estimate that only 13% of the adult population in Sierra Leone has an account with a financial intermediary. One of the reasons why intermediation
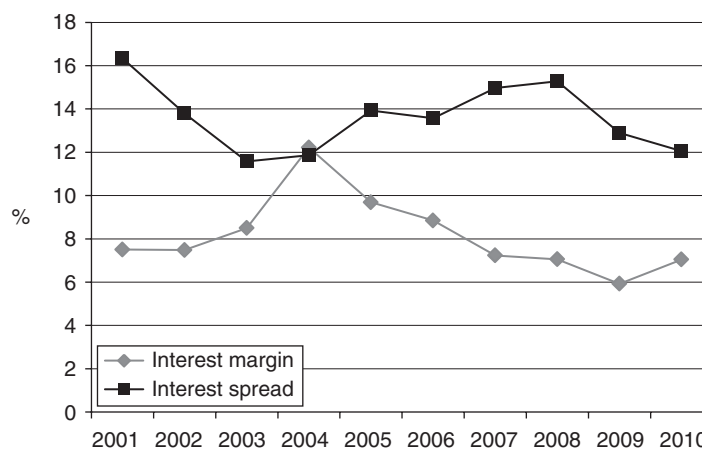
FIGURE 4.4. Interest rate spreads and interest margins 2001–10.
Source: author's calculations.

could be low is the presence of a non-competitive market structure. The high barriers to access which exist in Sierra Leone could also lead to low levels of intermediation.[11] More competitive banking systems are expected to exhibit lower interest spreads and margins because firms are faced with an ongoing incentive to improve their operations continuously, resulting in lower costs, lower prices and efficiencies in financial intermediation (Brock and Rojas Suarez 2000; Belaisch 2003; Beck and Hesse 2009; Rashid 2011). Interest spreads and margins serve as a useful proxy for intermediation efficiency in a financial system.[12] A lack of competition in banking markets weakens incentives for banks to improve efficiency leading to large interest rate spreads.

There are different definitions of interest spreads due to the fact that banks have different lending and deposit rates and follow different practices in setting rates. Following Folawewo and Tennant (2008), the interest rate spreads for the banking sector as a whole are shown in Figure 4.4 to give an indication of the broad state of financial intermediation efficiency in Sierra Leone. For interest margins, a wide measure is adopted here and is calculated as interest received minus interest paid divided by total assets (Brock and Rojas Suarez 2000).

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[11] Sierra Leone has been shown to have a higher level of barriers to services such as consumer loans, commercial loans and deposits when it comes to physical access, affordability and eligibility. For these three services, Sierra Leone has worse statistics for physical access compared to Ghana and Nigeria. Furthermore, in terms of minimum amounts required for opening saving and current accounts and minimum sums for consumer and mortgage loans, Sierra Leone has more stringent requirements than these countries when measured as a percentage of GDP per capita, only faring slightly better in terms of the conditions for loans to businesses (Demirgüç-Kunt *et al.* 2008).

[12] Interest rate spreads (*ex ante* spreads) are calculated from the contractual rates charged on loans and paid on deposits. Interest margins (*ex post* spreads) measure differences between banks' interest revenues and actual interest expenses.

Interest rate spreads decreased sharply from a high of 16.33% in 2001 to 11.58% in 2003 and then started to rise in 2004. Spreads widened from 11.58% at the beginning of 2004 to 15.28% in 2008 and then dropped by 3.9% to 12.89% in 2009. There was also a small dip in 2006. Further investigation revealed that the widening spreads are due to low and declining deposit rates and high lending rates. The deposit rate ranged from a low of 7.67% in 2001 to a peak of 11.07% in 2005 before dropping gradually to 8.95% in 2010. In 2005, the minimum lending rate rose considerably from 22% to 25% and stayed at that level up to 2008 before falling to its pre-2005 level. These wide spreads could also reflect risk premiums embedded in the lending rate and low deposit rates paid by banks because of high switching costs, which keep depositors captive, or because the banks are trying to cover other operating costs. Encouragingly, the interest spreads started to fall in 2009, although margins are on the increase.

Over the period, interest margins increased in the first half of the period peaking in 2004 at 12.21% before declining quite sharply in 2005 and more gradually up to 2009. The margin started to widen again in 2010 – an increase of 1.1% over 2009. While interest margins for domestic banks have been slightly higher than the industry average, the reverse is observed for foreign banks with lower margins than the sector. These figures do not indicate how much of this is due to interest from loans or to interest from investments in government securities which form a significant part of the banks' portfolios.

The determinants of interest rate spreads and interest margins are varied and apart from market structure can include transaction costs due to market frictions, information asymmetry and bank characteristics. The next section considers trends in two structural measures that are used as crude indicators of competitiveness, the concentration ratio and the Herfindahl–Hirschman index.

4.2.4 Concentration

Market concentration data is often used in initial assessments of competition even though it is now widely accepted that concentration does not measure competitiveness. Recent investigations however do concede that, *ceteris paribus*, there is a tendency for more concentrated markets to be less competitive (IBC 2011; House of Commons 2011). The concentration ratio CR_n measures the proportion of output that is attributable to the top n firms in an industry, ranked by market shares. By stressing the position of the top firms, the measure reflects inequality in the market but does not identify the distribution of output among the largest firms. An alternative measure, the Herfindahl–Hirschman index (HHI) is calculated as the sum of squared market shares (Rhoades 1993). This index takes into account both the numbers of firms and their relative sizes, capturing those firms that are not included in the n firm concentration ratios. The HHI is often used by competition authorities in initial assessments of the likely impact of mergers and acquisitions on market

TABLE 4.3. Concentration ratios and HHI by total assets, 2001–10.

Year	Asset concentration			Deposit concentration		Loan concentration	
	CR3 (%)	CR5 (%)	HHI	CR3(5) (%)	CR5 (%)	CR3 (%)	CR5
2001	90.8	100	2,839	93	100	83	100
2002	89	97	2,733	91	99	82	98
2003	85	97	2,508	87	97	80	98
2004	85.8	96.6	2,549	89	99	81	96
2005	82.7	95.7	2,387	84	97	84	96
2006	79.2	92.8	2,251	83	96	81	95
2007	69.1	85.6	1,832	75	92	72	86
2008	56.1	77.5	1,394	63	84	57	77
2009	53.9	73.6	1,282	60	78	55	73
2010	53.5	73.9	1,290	65	82	64	79

Source: author's calculations.

concentration.[13] To grasp the implications of the different HHI values over time, the HHI can be translated into a number equivalent index to indicate the number of banks of equal size that would give the value of the index.[14] However, like the concentration ratio, the HHI gives no indication about the behaviour of firms in the market.

Table 4.3 reports asset, deposit and loan concentration indicators for the period 2001–10. In 2001, the Sierra Leone banking system displayed a high degree of concentration. Asset concentration decreased significantly over the period with the three-firm concentration ratio falling by 37.7% and the five-firm concentration by 26.1%. The HHI also fell until 2009. There was a slight increase in 2010, reflecting Ecobank's takeover of the operation of Procredit Bank.[15] For example, the asset HHI of 2,839, in 2001, is broadly equivalent to a system with approximately four banks of equal size, while the asset HHI of 1,290 for 2010 is broadly equivalent to a system with approximately eight banks of equal size.

In 2001, 93% of deposits and 83% of loans were held by the three largest banks. The lower concentration levels for deposits would suggest more competition in the market for deposits than in the loan market. With new entry,

[13] In the US Merger Guidelines, an HHI index below 1,000 points indicates low concentration, between 1,000 and 1,800 points moderate concentration and above 1,800 points high concentration. Transactions that increase by more than 100 points in concentrated markets raise concern. Regulators generally consider an industry with an HHI of less than 2,000 points competitive, one with an HHI of between 2,000 and 6,000 points as oligopolistic and one with an HHI above 6,000 points as monopolistic.

[14] The number equivalent is calculated as the reciprocal of the HHI.

[15] In early 2010, Procredit Bank's management decided to discontinue operations on the grounds that new minimum capital requirements introduced by the Bank of Sierra Leone were not compatible with the bank's microfinance business model.
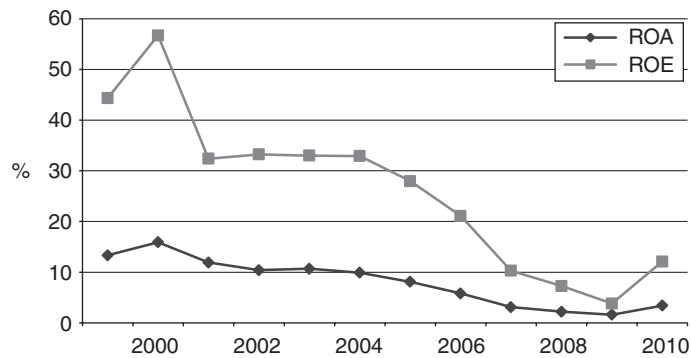
FIGURE 4.5. Banking sector profitability (ROA and ROE).

the concentration ratios dropped considerably and the data reveals a clear difference in the pattern of change over time. Decreases in concentration were significantly higher in the period between 2005 and 2010, than for the first half of the period. The three-firm deposit concentration ratio had dropped by 28% from 93% in 2001 to 65% in 2010. The decrease in the five-firm deposit concentration ratio was smaller, 18% with 15% of that decrease occurring at the time of significant foreign bank, between 2005 and 2010. In the case of loans, the three-firm concentration ratio fell by slightly less than the five-firm concentration ratio. The greater declines observed in the three-firm concentration ratios indicate that some of the new entrants are of a significant enough size to challenge the dominance of the large incumbent players.

Bank profitability in Sierra Leone at the beginning of the period studied was high. Return on assets was 11.9% in 2001 and return on equity 32.4%. The very high ROE figures recorded in the first half of the study period reflect the banks' very low level of capitalization. Subsequent increases in the minimum paid-up capital have seen the ROE figure fall quite dramatically.

These high levels of profitability may have been due to protected or uncontested markets. The very high profitability indicates that the domestic banks would struggle to meet the challenge of liberalization. With the influx of new entrants, there has been a marked decline in overall bank profitability as shown by both return on assets and return on equity, in Figure 4.5. By 2009, return on assets has declined to 1.6%, the lowest level in the period studied. This increased to 3.4% in 2010 largely as a result of the performance of the more established banks. Domestic banks have performed better than the foreign banks with new entrants recording significant losses in the period following entry. In 2010, half of the foreign banks recorded a loss, which is a concern. This could lead to the adoption of aggressive strategies to cover losses. The much reduced profitability can threaten the viability of some players and increase the risks of bank failure and its potentially contagious effects.

A comparison of profitability figures for Sierra Leone and Nigeria in the period just preceding the influx of Nigerian banks highlights the attractiveness of Sierra

Leone to Nigerian banks. Return on assets in the Nigerian banking sector was 8.37% in 2004, 3.01% in 2005 and 2.07% in 2006.[16] On the other hand, return on assets in Sierra Leone was 10.67%, 8.1% and 5.8%, respectively, for the three years.

The drop in profitability over the period, combined with the decline in concentration, provides support for an argument that competitive conditions intensified over the period when foreign bank entry was the defining feature of structural change in Sierra Leone banking. However, concentration levels started to increase again in 2010, which may indicate the beginnings of an increase in market power, in spite of the large number of banks. Structural measures such as the degree of concentration need to be supplemented with further analysis to determine to what extent limited competition may be a contributory factor to the low level of intermediation in the country and to determine whether banking markets in Sierra Leone can be characterized as contestable. Using the Panzar–Rosse framework and a unique bank-level data set, the next section provides a non-structural assessment of competitive conditions.

4.3 Measuring Competitive Conditions in Sierra Leone Banking Using the Panzar–Rosse Framework

The different metrics that have been used to evaluate and track competitive conditions in the banking sector can be traced to two major streams in the industrial economics literature on competition: the traditional structural approach and the alternative, non-structural approach which is adopted by proponents of the new empirical industrial organization (NEIO) methodology. The traditional approach infers competitive conditions from market structure variables and is underpinned by the structure–conduct–performance (SCP) framework and the efficient structure hypothesis.[17] The SCP framework proposes that markets characterized by few firms and high barriers to entry (high concentration) will facilitate pricing conduct aimed at achieving joint profit maximization via collusion, price leadership or other tacit pricing arrangements, yielding profits and prices that are greater than the competitive norm. Studies adopting this approach focus on concentration as a determinant of competition and use structural measures such as concentration ratios and the Herfindahl–Hirschman index as primary measures of competition.

The efficient structure hypothesis suggests a reverse view of market concentration, arguing that concentration within an industry is the result of competition which has the effect of producing efficiency differences between firms. It is the superior efficiency of large firms that leads them to increase in size which results in higher market concentration (Demsetz 1973; Peltzman 1977; Brozen

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[16] See Central Bank of Nigeria Annual Reports for 2004, 2005 and 2006.

[17] The SCP framework was developed by Bain (1951, 1956) out of the seminal work of Chamberlain (1933) and Robinson (1933) on imperfect competition.

1982). Starting with the work of Berger and Hannan (1993) and Berger (1995) the collusion/efficiency question has been explored in several competition studies using regressions that include proxies for market concentration and efficiency as variables to explain changes in banks' profitability.

Alternative non-structural measures proposed by NEIO models do not rely on observations of the competitive environment but focus on actual bank behaviour as a determinant of competition and also take contestability into account. New empirical industrial organization models commonly assess competitive conditions by estimating deviations from competitive pricing. Techniques that follow a non-structural approach include those developed by Breshanan (1921), Lau (1982), Iwata (1974), Hall (1988), Roeger (1995), Rosse and Panzar (1977) and Panzar and Rosse (1982).

We now present the Panzar–Rosse framework before testing the hypotheses derived from the framework against the data. The Panzar–Rosse model provides a market power test that uses the relationship between bank revenues and input prices as a means of determining the nature of competitive conditions in an industry. Rosse and Panzar (1977) and Panzar and Rosse (1982, 1987) developed a competition measure, the H-statistic, which can reflect the structure and conduct of the market to which a firm belongs by measuring the extent to which equilibrium revenues respond to changes in input prices. The H-statistic is derived by summing the elasticities of a particular firm's (bank's) revenues with respect to input prices.

Table 4.4 summarizes how the H-statistic, which ranges from $-\infty$ to 1, is commonly interpreted to distinguish between different competitive environments. Negative values indicate imperfect competition. A negative H-statistic indicates that an increase in factor prices, increases marginal costs and reduces output and revenues. Values between 0 and 1 indicate monopolistic competition. If H is positive but less than 1, increases in input prices lead to revenues increasing less than proportionately to the changes in input prices. $H = 1$ is widely interpreted as perfect competition.[18] When $H = 1$, increases in input prices raise costs without affecting the optimum level of output produced by individual banks. Industry revenues rise due to exit of some firms and an increase in price as demand increases for the output of remaining firms.

The following reduced-form equation is estimated to calculate the H-statistic:

$$\log R_{it} = \alpha + \sum_{j=1}^{j} u_j \log P_{it}^j + \sum_{k=1}^{k} \beta_n \log \mathrm{CF}_{it}^k + \varepsilon_{it},$$

where R_{it} denotes firm revenue, P_{it}^j denotes the vector of the price of factors with $j = 3$ inputs, CF_{it}^k denotes the vector of bank-specific and other control

[18] This interpretation has been challenged by Llewellyn and Weyman Jones (2010, p. 14) who have pointed out that it is based on a misreading of the original work of Panzar and Rosse. In the alternative interpretation, all values of the statistic that are less than or equal to 1 are compatible with monopolistic competition, while some values are also compatible with either monopoly or perfect competition.

TABLE 4.4. Interpretation of the PR H-statistic.

Estimated value of H	Competitive environment
$H = 1$	Perfect competition in long-run equilibrium
	Natural monopoly in a perfectly contestable market
	Sales maximization subject to a break-even constraint
$0 < H < 1$	Monopolistic competition
$H \leqslant 0$	Conjectural variation oligopoly
	Neoclassical monopoly
	Collusive oligopoly
	Short-run competition

variables for each bank that may shift the revenue schedule, and ε_{it} denotes the error term.

The Panzar–Rosse test is based on a static analytical model and relies on a market equilibrium condition that the data observations must be in long-run equilibrium at each point the data is observed. This is to avoid ambiguity in interpreting the H-statistic in cases where the value of H is negative. When a market is in equilibrium, $H < 0$ reflects imperfect competition but if a market is in structural disequilibrium, competitive firms can also exhibit $H < 0$. In equilibrium, the sum of ROA elasticities with respect to factor input prices should be zero as return on assets should be uncorrelated with input prices.[19] Shaffer (1982) suggests a test for equilibrium. In the empirical test for market equilibrium, profits, usually measured by return on assets or return on equity, replaces revenues as the dependent variable in the same reduced-form equation that is used to calculate the H-statistic. This is shown below:

$$\log \mathrm{ROA}_{it} = \alpha + \sum_{j=1}^{j} u_j \log P_{it}^{j} + \sum_{k=1}^{k} \beta_n \log \mathrm{CF}_{it}^{k} + \varepsilon_{it}.$$

Taking the sum of ROA elasticities to be E, $E = 0$ indicates equilibrium, while $E < 0$ indicates disequilibrium. The definition of what constitutes equilibrium in the banking sector is unclear as highlighted by Shaffer (1982). When used in banking studies, long-run market equilibrium has been taken to imply that the banking system has attained a reasonable level of stability, that it is readily able to absorb shocks and that market conditions do not induce entry or exit (Molyneux 1996; Claessens and Laeven 2004; Buchs and Mathisen 2005; Musonda 2008; Bikker *et al.* 2009).

Although the PR model has been used widely to assess market conditions in large cross-country studies as well as for single countries, there have

[19] The reasoning is that long-run competitive equilibrium implies that $P = \mathrm{MC} = \mathrm{AC}$ with zero economic profits for any set of input prices. In the same vein, in disequilibrium, increases in factor prices result in subnormal profits until the market adjusts.

been few studies of this type for African countries.[20] A summary of relevant country-specific African studies and cross-country studies that include African countries is presented in Table 4.5. The results of these studies generally provide evidence of monopolistic competition with the H-statistic ranging from 0.39 to 0.89. Also competitive conditions have been found to improve following a period of liberalization or financial sector reform (Mugume 2007; Hauner and Peiris 2006; Biekpe 2011).

These studies have generally used the ratio of revenues to total assets as the dependent variable. Some have also included log of total assets as an independent variable. Bikker *et al.* (2009) have challenged these approaches, pointing out that they depart from the Panzar and Rosse theoretical framework and argue that such scale corrections constitute a misspecification that will bias the H-statistic upwards.[21] Furthermore, this misspecification makes it impossible to distinguish between perfect competition and imperfect competition in cases where the H-statistic is negative. By using the ratio of revenues to total assets for the PR test, studies estimate a price equation, rather than a revenue equation and so the H-statistic that is obtained does not reflect how output and ultimately, revenues are affected by changes in input prices. Buchs and Mathisen (2005) estimated price equations with and without log of assets to assess the effect of scale and found that the specifications which did not include log of assets provided more stable results.

This study departs from previous African studies and evaluates competitive conditions in Sierra Leone during 2001–10 by using unscaled revenue equations in which revenues are not divided by total assets. Very few studies have used unscaled revenue equations. These include Goddard and Wilson (2009) in a cross-sectional study of European banking, Bikker *et al.* (2009) in a cross-sectional study of 101 countries from developed and developing economies, Olivero *et al.* (2010) in a study of Latin American and Asian countries and Pawlowska (2011) in a study of Polish banking. Daley and Matthews (2009) use a scaled revenue equation in which revenues are not divided by total assets for the independent variable but the log of total assets is included as an independent variable.

4.3.1 *Model Formulation, Variables and Data*

Concurring with Bikker *et al.* (2009), Goddard and Wilson (2009), Olivero *et al.* (2010), Pawlowska (2010) and Daley and Matthews (2011), the Panzar–Rosse model for obtaining empirical measures of the H-statistic and evaluating

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[20] See, for example, Shaffer (1993), Molyneux *et al.* (1996), Prasad and Ghosh (2007) and Rezitis (2010) for single-country studies, and Claessens and Laeven (2004), Molyneux *et al.* (1994), Casu and Girardone (2006), Bikker *et al.* (2009) and Goddard and Wilson (2009) for cross-country studies.

[21] Scale correction has been introduced in empirical PR models to account for the intuition that bigger banks are more likely to earn larger revenues in ways that are not related to changes in input prices.

competitive conditions in Sierra Leone banking is given by the following reduced-form revenue equation:

$$\ln \text{REV}_{it} = a + b\ln(\text{PF}) + c\ln(\text{PL}) + d\ln(\text{PK}) + e\ln(\text{CAR})$$
$$+ f\ln(\text{LOTA}) + g\ln(\text{RTBR}) + h\ln(\text{INF}) + \varepsilon_{it}.$$

The model for obtaining the equilibrium conditions is:

$$\ln(1 + \text{ROA})_{it} = a + b_1\ln(\text{PF}) + c_1\ln(\text{PL}) + d_1(\text{PK}) + e\ln(\text{CAR})$$
$$+ f\ln(\text{LOTA}) + g\ln(\text{RTBR}) + h\ln(\text{INF}) + \varepsilon_{it},$$

where i indexes banks and t indexes time. REV_{it} is revenue using either total revenue or interest revenue. PF, PL and PK define the unit prices of the three factor inputs, where PF equals the price of funds, PL the price of labour and PK the price of capital (other expenses/fixed assets).[22] The unit prices of the inputs are proxied by ratios of expenses to volumes, where the data for volumes is available. The unit cost of labour is measured by the ratio of personnel expenses to total assets. The ratio of personnel expenses to the number of employees is considered a better measure of the unit of labour, but where employee data is not available consistently for some banks, total assets is used as a denominator. The ratio of interest expenses to total funding is used as a proxy for the unit cost of funds and the ratio of other expenses to fixed assets, is used to proxy for the unit cost of physical capital. The H-statistic is $b + c + d$.

Bank-specific control variables are introduced to account for unique bank policies and circumstances that may be reflected in the revenues of individual banks such as portfolio composition, size, earnings potential, risk profile, growth orientation, liability structure and financial problems. The bank-specific control variables used in this study are the ratio of loans to assets (LOTA) as a proxy for the relative composition of bank assets and the capital adequacy ratio, CAR to account for the impact of regulatory capital requirements. Like the ratio of loans to assets, CAR is also an indirect measure of risk. Coccorese (2004) acknowledges the significance of the macroeconomic environment for banking competition. Consistent with Buchs and Mathisen (2005), Hauner and Peiris (2005) and Musonda (2008) who conducted studies for sub-Saharan African banking, two time series macroeconomic control variables are included. These are the 91-day Treasury bill rate (RTBR) and the inflation rate (INF).

Since the PR test is only valid if the market is in equilibrium, it is necessary to also estimate the model, using return on assets as the dependent variable.

[22] In this study, the definition of inputs follows the intermediation approach proposed by Sealy and Lindley (1977) in which labour, capital and purchased funds are usually specified as inputs while loans and deposits are specified as outputs. As funds borrowed from depositors are used in the production of earning assets, deposits are, therefore, intermediate outputs used in the final economic output of the bank.

TABLE 4.5. Panzar–Rosse model studies and results in African countries.

Authors	Countries	Sample period and number of banks	Results
Mlambo, K., and Mthuli, N. (2011)	South Africa	1999–2008 26 banks	0.57 Monopolistic
Biekpe, N. (2011)	Ghana	2000–2007: 17 banks	0.66 Monopolistic competition
Hamza, R. A. (2011)	Tunisia	1999–2008: 12 banks	0.67–0.71 Monopolistic competition
Mensi, S. (2010)	Tunisia	1990–2007: 10 banks	0.88–0.89 Monopolistic competition
Kasekende, L., Mlambo, K., Murinde, V., and Zhao, T. (2009)	SANE countries (South Africa, Algeria, Nigeria and Egypt)	1992–2007: Cross-sectional	Monopolistic
Greenberg, J. B., and Simbanegavi (2009)	South Africa	1998–2007: 14 banks	0.74 Could not reject perfect competition

TABLE 4.5. Continued.

Authors	Countries	Sample period and number of banks	Results
Musonda, A. (2008)	Zambia	1998–2006 Quarterly data: 13 banks	0.65 Monopolistic
Mugume, A. (2007)	Uganda	1995–2005	0.28 Monopolistic
Hauner, D., and Peiris, S. J. (2006)	Uganda	March 1999–June 2004: 15 banks, quarterly panel data	0.39 average Monopolistic competition
Buchs, T., and Mathisen, J. (2005)	Ghana	1998–2003: 20 banks	0.56 average Monopolistic competition
Claessens and Laeven (2004)	Kenya, Nigeria and South Africa (in a study of 50 countries)	1994–2001	Monopolistic competition 0.58, 0.67 and 0.85, respectively

To deal with cases where ROA may have a small negative value, 1 is added to ROA and $\ln(1 + \text{ROA})$ is used as the dependent variable. The equilibrium E-statistic is $b_1 + c_1 + d_1$. Consistent with Shaffer (1982), Moylneux *et al.* (1996) and Claessens and Laeven (2004), the F-test is used to determine whether $E = 0$.

As one of the goals of the study is to analyse the evolution of competition over the period, the sample is split into two subperiods (2001–5 and 2006–10) to assess the impact of time on competitive conditions. 2006 marks a halfway point in the full sample and, furthermore, significant foreign bank entry and a marked increase in the number of banks started in 2006.

4.3.2 *Bank Data Sample*

The relevant market under consideration consists of all commercial banks as suppliers of retail banking products. The data set covers all banks operating the Sierra Leone in the period 2001–10. The data set comprises 2 state-owned banks, 1 domestic private bank and 11 foreign banks. Quarterly data on the bank-specific variables was extracted from a data set made available by the Bank of Sierra Leone. The information on Treasury bill interest rates and inflation rates was compiled from the Bank of Sierra Leone's Annual Reports and Economic Reviews. As the data was obtained from central bank returns, data was available on a consistent basis for all banks in the data set. The sample used in the study is an unbalanced panel data set. All observations where banks reported missing values were excluded. For each factor input price, observations lying outside the 1–99th percentile range were removed from the sample.

4.4 Empirical Results

This section presents the results of the estimations using both interest revenue and total revenue as dependent variables. Casu and Girardone (2006) have argued that increased diversification of banks' activities and the importance of fee income justifies considering both interest revenue and total revenue as dependent variables. In Sierra Leone however, interest revenue accounted for close to 60% of the banking sector's revenues in 2010, an increase of almost 20% when compared to 2001. For domestic banks, the proportion of interest revenue was 64.6% while it was only 52.7% for foreign banks. Furthermore, the proportion of interest revenue to total revenue increased from 42.4% in 2001 to 57.8% in 2010.

Consistent with the empirical literature on competition in banking markets, the study employs fixed-effects panel data estimators. Goddard and Wilson (2009) have challenged this approach, arguing that the PR test should be based on a dynamic adjustment model since adjustments for firms may be partial and not instantaneous, thus violating the equilibrium assumption of the PR model. The dynamic panel estimator was not considered appropriate

TABLE 4.6. Value of the Wald test to determine a long-run equilibrium in the Sierra Leone banking sector between 2001 and 2010 (E_0: $E = 0$. E_1: $E < 0$).

Year	ROA E-statistic value	Wald test value for $E = 0$ and probable p-value	
2001–10	0.004	0.382	
		0.2262	Equilibrium
2001–5	0.033	*0.0000*	
		0.0000	Disequilibrium
2006–10	−0.01	0.0726	
		0.2358	Equilibrium

p-values obtained when ROE is the dependent variable are in italics.

for this study as the cross-sectional dimension of the data (number of banks) is much smaller than the times series dimension. The Breusch–Pagan Lagrange multiplier statistic was used to test whether the panel estimation approach was more appropriate than the pooled approach and the Hausman test was used to determine whether the fixed-effects estimator was preferable to the random effects estimator. The fixed-effects estimator uses different aspects of the panel data and allows for a greater heterogeneity among the parameters with respect to banks and/or time. In fixed-effects models, a varying intercept term is assumed to capture the differences in behaviour over groups (banks) and where the slope coefficients are assumed to be constant. The one way model allows the intercepts to vary across banks only, by introducing a set of $N - 1$ dummy variables to account for the effects that are specific to each bank but are constant across all time periods. The LM test supported the panel regression approach and the Hausman statistic supported fixed-effects panel regression approach.

All the regression models are analysed using the fixed-effects estimation approach based on the results of the Hausman test. The regressions were estimated with robust standard errors in order to correct for heteroscedasticity and cross-sectional correlation. Regressions were run first to test for equilibrium conditions in the full and subsamples. The results reported in Table 4.6 show the E-statistic value and the p-values for the long-run equilibrium tests when ROA is the dependent variable. p-values are also shown for when the equation was estimated using ROE as the dependent variable. The null hypothesis of long-run equilibrium is accepted if the p-values are larger than 0.05.

Using both ROA and ROE, the tests confirmed that the data is in long-run equilibrium for the full sample period, 2001–10. This was also the case for the second subsample period (2006–10). For the earlier period (2001–5), the test results indicate that the market was not in equilibrium. Given the level of entry that has taken place in the Sierra Leone banking sector, it is not surprising to find some evidence of disequilibrium over the period studied. This finding

is similar to that of a number of other studies where the banking sector had experienced dynamic changes in the period studied.[23]

The results obtained for the tests of competitive conditions, using interest revenue and total revenue are shown in Table 4.7. Focusing first on the results which describe the estimates for interest revenue as the dependent variable, the estimated value of the H-statistic in all cases (full sample period and both subsample periods) is significant and positive. Following Bikker *et al.* (2009), we interpret the results as follows: a positive value is inconsistent with any form of imperfect competition. The Wald test (F-statistic) for testing the hypothesis that the H-statistic for the period is equal to zero can be rejected at the 5% level of significance, allowing us to reject monopoly. For the entire period, where the H-statistic is 0.87, the null hypothesis that the H-statistic is equal to 1 for the full sample period cannot be rejected at the 5% level of significance. This does not provide a clear indication of the competitive structure of the banking market. The results at best indicate perfect competition or a high degree of contestability and at worst borderline monopolistic competition.

Similarly, for the H-statistic estimate of 1.08 for the first subperiod 2001– 5 shown in column II, while it is possible to firmly reject monopoly, $H = 1$ or a perfectly competitive banking market cannot be rejected. Furthermore, for the first subsample, the equilibrium test $E = 0$ was rejected in favour of $E < 0$. This finding suggests that competitive conditions prevailed generally but there was also some structural disequilibrium. The results reported in column III for the second subsample showed a decrease in the H-statistic to 0.66. The H-statistic in this case is statistically different from both 0 and 1, rejecting monopoly and perfect competition and indicating the revenues were earned under conditions of monopolistic competition. Following Bikker and Haaf (2002), the predominant practice in the literature has been to interpret the H-statistic cardinally with lower values representing less competition and higher values as representing more competitive or contestable markets.[24]

These results indicate that while there has been a rapid increase in the number of banks, competitive conditions appear to have worsened after 2005. As foreign bank entry increased, a more turbulent and fierce competitive environment may have led banks to mimic each other's strategic approach resulting in them targeting the same markets and becoming more homogeneous in terms of their core offering. Consequently, their distinctive features became less discernible. As profitability declined, in a bid to regain market power, it appears that banks have sought to reverse the situation and reorientate themselves through differentiation strategies. The danger of such situations where banks

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[23] See, for example, Matthews *et al.* (2007) for a study of the British banking industry; Mugume (2007) for Uganda; Daley and Matthews (2009) for Jamaica; and Stavarek and Repkova (2011) for Czech Republic.

[24] The interpretation of the H-statistic as a cardinal measure is a contentious issue in the recent literature. Shaffer (1982) and Bikker *et al.* (2009) caution against interpreting the H as cardinal. They emphasize that the PR test is a one tail test in which a negative value may arise under various conditions but a positive value is inconsistent with imperfect competition.

focus on specific strategies or niches and mimic each other's strategies is that the heightened competition risk can give rise to financial stability concerns.

Another possible factor could be that as the number of banks increases and the environment becomes more turbulent, structural impediments such as a lack of transparency and difficulty in acquiring reliable information could prevent banks from operating competitively. On the deposit side, for example, increased opaqueness could deter customers from switching to the new banks, thereby leading to a worsening of competitive conditions. Information limitations can also inhibit competition in lending markets as foreign banks may not be able to acquire information as easily as domestic banks even though, as argued by Claeys and Hainz (2006), they may be better at screening borrowers. As pointed out earlier, in the case of Sierra Leone, informational problems would have been exacerbated because of the effect of the war.

The findings differ from those of Buchs and Mathisen (2005) and Biekpe (2011) for Ghana and Mugume (2007) for Uganda. They had found that competition increased over time. Apart from the fact that the financial sectors of these countries were more stable and developed than that of Sierra Leone, a key difference between these countries and Sierra Leone is that they had introduced comprehensive packages of financial reforms, in addition to liberalizing entry to foster competitiveness. Ghana's reforms included restructuring of distressed banks, strengthening of the regulatory and supervisory framework, privatization of state-owned banks and promotion of non-bank financial institutions (Bawumia 2010).

The regression coefficients for the unit prices of labour, capital and funds had mixed signs. Among the different input prices, the price of capital and the price of funds contribute predominantly to the explanation of the interest revenues of the banks. The price of capital is particularly emphasized in the period between 2001 and 2005. This is reversed in the latter half of the study period when price of funds becomes slightly more important. In Sierra Leone's postwar reconstruction context, even though re-establishing physical infrastructure and the costs of new entrants setting up a branch network are significant sources of expenditure, the benefits from capital expenditure appear to outweigh the costs. In studies for developed countries, the coefficient on the unit cost of capital is usually very small, reflecting the stability of the capital element after a period of time. It is therefore not surprising to see the significance of the cost of capital declining between 2006 and 2010. The price of labour is significant and positively related to revenues for the first sample period but not in the second sample period. This indicates that personnel costs accounted for a higher proportion of the overheads of banking firms between 2001 and 2005. New entrants do not have a high staff component in the period immediately after entry but would recruit more staff as their businesses grow.

The negative sign on the capital adequacy ratio, CAR, suggests that banks may be holding higher levels of capital which attract funding costs. Schaek and Cihak (2007) have found that in a more competitive environment, banks are likely to hold more capital than the levels required by prudential regulations,

TABLE 4.7. Regression results I: unscaled revenue equations.

Coefficient/ t-statistic	ln (interest revenue) as dependent variable			ln (total revenue) as dependent variable		
	I 2001–10	II 2001–5	III 2006–10	IV 2001–10	V 2001–5	VI 2006–10
ln PL	−0.0293 −0.31	0.265 2.51**	0.0547 0.66	−0.03765 −0.48	0.3212 3.46**	−0.0168 −0.25
ln PK	0.4669 4.35**	0.7867 6.51**	0.2836 2.49**	0.494972 5.36**	0.6842 6.67**	0.3753 3.63**
ln PF	0.4342 3.33**	0.0486 0.42	0.3345 3.00**	0.419512 3.75**	0.0387 0.42	0.3473 3.4**
ln LOTA	0.1924 1.67*	0.411 2.28**	0.0735 0.75	0.1692 1.71*	0.3049 2.18**	0.0934 1.08
ln CAR	−0.2488 −2.17**	0.0611 0.54	−0.3262 −2.83**	−0.2617 −2.6	0.0386 0.43**	−0.3335 −3.13**
ln RTBR	1.9788 3.01**	1.535 3.50**	6.6487 4.95**	1.2701 2.26**	0.9145 2.70**	6.4654 5.27**
ln INF	7.1834 4.71**	5.0157 4.10**	10.7146 4.49**	5.2493 4**	3.23 3.06**	10.5901 4.91**
Cons	17.8803 22.47	16.4575 22.04	17.6206 24.14	18.50811 27.1	17.3561 28.49*	18.002 27.43
No. of obs.	303	108	195	303	108	195
Adj. R-squared	0.73	0.93	0.83	0.79	0.94	0.87
H-statistic	0.87	1.08	0.66	0.87	1.03	0.7
H_0: $H = 0$ F-statistic	96.57	327.52	63.87	134.22	381.46	89.06
H_0: $H = 0$ p-value	0	0	0	0	0	0
H_0: $H = 1$ F-statistic	2.09	2.73	15.01	2.65	0.69	15.48
H_0: $H = 1$ p-value	0.1496	0.1018	0.0001	0.1048	0.4098	0

* and ** denote significance at the 5% and 10% levels, respectively. t-statistics are shown below their respective coefficient entry.

even though this may be more expensive to fund than deposits. Capital supports the long-term viability of a bank and its ability to generate profits in the future. It may also be that, with increased competition, banks are not able to find good lending opportunities and so maintain high equity capital.

The ratio of loans to assets, LOTA is positive and significant for the full sample period and the period between 2001 and 2005. As loans carry credit risk, this indicates that banks may be charging a risk premium to compensate for this risk, leading to increases in both interest and total income. Both the macroeconomic variables RTBR and INF, are signed as expected and significant. The positive finding for the treasury bill rate is similar to that of Buchs and

TABLE 4.8. Regression results II: price equations.

Coefficient/ t-statistic	ln (interest revenue/total assets) as dependent variable			ln (total revenue/total assets) as dependent variable		
	I 2001–10	II 2001–5	III 2006–10	IV 2001–10	V 2001–5	VI 2006–10
ln PL	0.7026	0.5114	0.7272	0.6943	0.5676	0.6556
	4.08**	5.86**	4.16**	4.50**	5.98**	4.18**
ln PK	0.1489	0.4321	0.0469	0.1769	0.3297	0.1386
	1.42	5.81**	0.44	1.90*	4.40**	1.48
ln PF	−0.0630	−0.0361	−0.0871	−0.0777	−0.0460	−0.0743
	−0.62	−0.67	−0.78	−0.89	−1.14	−0.74
ln LOTA	0.2205	0.1155	0.3571	0.1973	0.0093	0.3771
	1.56	1.80*	2.20**	1.59	0.27	2.59**
ln CAR	0.0032	−0.0494	−0.0270	−0.0096	−0.0720	−0.0343
	0.05	−0.76	−0.30	−0.15	−1.16	−0.41
ln RTBR	0.3433	0.2553	1.3262	−0.3653	−0.3651	1.1429
	1.13	1.35	1.16	−1.45	−2.92**	1.13
ln INF	0.1466	1.532	1.0457	−1.7874	−0.2536	0.9212
	0.17	2.31**	0.50	−2.49**	−0.46	0.49
Cons	−0.2378	−0.6679	−0.0724	0.3899	0.2307	0.3091
	−0.46	−1.47	−0.11	0.87	0.52	0.53
No. of obs.	303	108	195	303	108	195
Adj. R-squared	0.65	0.89	0.67	0.69	0.91	0.72
H-statistic	0.78	0.91	0.69	0.79	0.85	0.72
H_0: $H = 0$ F-statistic	206.18	548.99	65.73	251.00	552.99	91.32
H_0: $H = 0$ p-value	0	0	0	0	0	0
H_0: $H = 1$ F-statistic	14.84	5.70	13.64	17	116.86	13.81
H_0: $H = 1$ p-value	0.0001	0.0189	0.0003	0	0	0.0003

* and ** denote significance at the 5% and 10% levels, respectively. t-statistics are shown below their respective coefficient entry.

Mathisen (2005) and Biekpe (2011) for the Ghanaian banking sector, indicating the significant impact of the government financing element on banks' revenues. Government securities are a less risky form of investment for banks and, given the attractive interest rates, can reduce bank lending to the private sector. The results for the alternative specification in which total revenue is the dependent variable mirror the findings obtained with the interest revenue specification (reported in columns IV, V and VI).

The model was also estimated using the ratio of revenue to total assets as the dependent variable.[25] As noted earlier, this approach is widely adopted in

[25] Bikker *et al.* (2009) refer to these specifications as price equations.

African studies that apply the PR test. The findings are reported in Table 4.8. Unlike the results for the unscaled revenue specification, the price equations' results indicated that revenues were earned under conditions of monopolistic competition for the entire period as well as for the two subsamples when interest revenue was used as the independent variable. However, similar to the unscaled revenue estimations, the results indicated that competitive conditions seemed to worsen in the second subsample period. The H-statistic fell from 0.91 for the first period to 0.69 for the second period when interest revenue divided by total assets was the dependent variable and from 0.85 to 0.72 when total revenue divided by total assets was the dependent variable.

To check robustness and explore the role of size of banks further, a scaled revenue specification was also estimated by including log of total assets as an independent variable and using log of interest revenues and log of total revenues as dependent variables. Again in all the estimated results, the F test rejected both monopoly and perfect competition indicating that both interest and total revenues appear to have been earned under conditions of monopolistic competition throughout. Consistent with the other two specifications, the results indicated that there seemed to be a marked deterioration in competitive conditions in the second half of the period. These results show that the size of banks is an influential factor in determining the level of interest and total revenues generated.

Given the key structural changes in the sector over the period, these results are to be interpreted with some caution as the Panzar–Rosse test can give misleading results in cases where banks have not completely adjusted to market conditions and markets are not in equilibrium. In such cases, the bias is towards a conclusion of monopoly power. In addition, the PR test is unable to distinguish between cost plus pricing and competitive pricing as cost plus pricing is not associated with a particular level of market power. It is also doubtful whether stable cost and revenue functions existed during the period analysed. Gutierrez de Rozas (2007) points out that when using unbalanced data sets in such studies that cover a period of rapid entry, the data would include new entrants that would behave differently, perhaps more aggressively, as compared to cases where market equilibrium may have prevailed throughout with no entry or exit. Figures for newly established banks may distort the data set for the rest of the banking sector.

4.5   Policy Implications

Sierra Leone's Financial Sector Development Plan recognizes that several factors could determine the low level of intermediation in Sierra Leone apart from a non-competitive market structure. Although creating a competitive financial sector is one of the Plan's broad goals, an explicit competition policy for banking has not yet been outlined. The findings of this study provide an opportunity to reflect on competition related aspects of Sierra Leone's financial

sector development, especially as they suggest that competitive conditions may not be ideal in spite of the large number of banks in operation. The aim of a competition policy is to develop a market in which there are a sufficient number of suppliers that offer a range of services and choice to consumers. Furthermore, competition is more likely where conditions that are conducive to innovation are maintained.

4.5.1 Foreign Bank Entry

Opening up markets to foreign banks is a feature of structural competition policy which can have many benefits. The challenge for policymakers is to gauge how best to open domestic banking markets to foreign bank entry so that the benefits will outweigh the costs. The dimensions of entry that need consideration include the speed of entry, mode of entry and origin of entrants. What is deemed reasonable would depend on the size of the market and the state of the domestic banks' balance sheets. The smaller the size of the market, the greater the likelihood for overcrowding to occur before the full benefits of foreign bank entry can be harnessed. A small market cannot accommodate too many players without stability concerns. An incremental rate of entry could allow domestic banks to make cost and efficiency adjustments and be in a better position to compete in a manner that is not destructive. The speed of entry may create perverse incentives for local banks with weak balance sheets to take more risk. In terms of scheduling the process, it may even be better first to privatize government-owned institutions, before opening a banking sector to rapid foreign bank entry so that sound corporate governance arrangements are in place.

The origin of entrants and mode of entry are other significant considerations. Recent work has shown that the country of origin of foreign banks may be important in determining their impact on competition. Pohl (2011) finds that regional south–south banks in particular seem to enhance domestic banks' efficiency through spillover and competition effects.[26] South–south banks may be more prepared to serve less transparent customers because of their experience of doing business in more challenging environments and are more likely to specialize in the same target markets as domestic banks. The large number of Nigerian banks in Sierra Leone does not foster much diversity in the banking system. Diversity in the origin of foreign entrants is needed to limit the potentially damaging effects of shocks that can be easily transmitted from the foreign banks' home country to the Sierra Leonean economy through lending channels.

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[26] Foreign banks from developing countries entering other developing countries are referred to as south–south banks and foreign banks from industrialized countries entering developing countries are referred to as north–south banks.

Furthermore, all foreign bank entry has been by greenfield investment.[27] The mode of entry can have different effects on the incentives of domestic banks. A mixture of greenfield entry, entry by mergers with local banks or through strategic investments in local banks can lead to more effective competition. The general consensus is that greenfield investment leads to greater competition than entry by acquisition (Claeys and Hainz 2006; Schmidt 2008). Foreign bank entry typically results in lower profitability for domestic banks. A downside is that the credit quality of the domestic banks' loan portfolios could tend to deteriorate more as they strive to make up for falling profitability. In particular, large government-owned domestic banks are more likely to be susceptible to moral hazard by virtue of the fact that they are too big or too systematically important to fail and also government ownership may not have created the incentives for sound management. An approach worth considering is to require new entrants to make equity investments in domestic banks either by way of transfer of shares or by existing shares or by issuing new shares. Entry through strategic investments in domestic banks has been widely used in China, for example, with some success. Such a strategy is expected to have a positive effect on management and corporate governance in the domestic banks. While such investment is expected to be long term, measures will have to be put in place to facilitate orderly exit of investment.

4.5.2   Diversification of Financial Services Providers

Diversity and heterogeneity in the spectrum of financial service providers is more likely to enhance competition, fuel innovation and widen access as various institutions would have different cost structures, attitudes towards and capacity for innovation, strategies and orientation to serve financial needs. Where competition is between institutions that are very similar, it can intensify to the point where it becomes destructive rather than productive. Sierra Leone's banking system is very limited, comprised only of commercial banks. Lessons can be drawn from the banking systems of other West African countries that have merchant and development banks as well as thriving mutual and cooperative sectors in which cooperative banks, credit cooperatives and credit unions play a significant role. Sierra Leone's community banks have a very narrow remit and risk losing their relevance to the changing financial needs of the Sierra Leonean economy in terms of promoting financial inclusion and competition.[28]

Developing financial cooperatives provides a valuable contribution to competition and financial sector development. The key institutional characteristics of financial cooperatives that differentiate them from banks are their

[27] The term 'greenfield investment' refers to an entry strategy where the entrant sets up an entirely new operation, for example, by creating a new subsidiary.

[28] According to the Poverty Reduction Strategy Paper, these banks were established to empower communities 'to own and manage the development process' as well as to 'provide an institutional anchor to the government's microfinancing programme' (GSL 2005, p. 58).

governance structure and their dual economic and social goals. The aim of these member-owned institutions is to promote their members' economic interest and welfare, rather than to maximize profits. Typically, they emerge to fill gaps in financial services provision and as argued by Cuevas and Fisher (2006) offer a 'natural solution' to the problem of adverse selection in financial intermediation which leads to the exclusion of some economic agents from financial services.[29] They can bring competitive pressures to bear on private sector banks because they often have lower operating costs and do not seek to maximize profits. The cooperative form has advantages in addressing informational market failures, combating the effects of excessive market power and engendering trust. The members are also customers and it is expected that the governance structure limits the exploitation of vulnerabilities in the members' position such as those that may arise from their poor bargaining power or level of financial capability.

Cooperatives can fulfil the role of community banks but are more flexible and have a greater potential for adaptation with the changing needs of the financial system. This is because they exhibit significant heterogeneity. As Fonteyne (2007) points out cooperatives can range from small-scale self-help community-based institutions to large-scale retail banking institutions and diversified financial conglomerates. They can also form networks which would allow them to take advantage of economies of scale and scope. They can, in addition, be the heart of financial education initiatives. By pursuing a mixed outreach strategy, the membership of community-based cooperatives and credit unions can draw from a cross-section of society fostering wider participation. The activities would focus on creating a critical strategic fit between the needs of the specific community and the provision of the cooperative, rather than a 'one size fits all' offering.

In terms of their operations, cooperatives focus on traditional financial intermediation but do so in innovative ways. Decker (2010) found evidence of product and process innovation by British credit unions to address financial exclusion in sustainable ways. Credit unions in particular have enjoyed much success in Ghana and the Gambia particularly in providing services to those below the poverty line, first time users of formal financial services and for providing funds and cash management services to petty traders and small businesses. In this way they can play a positive role in creating a pathway to financial inclusion for the unbanked population. Sierra Leone's postwar experience with NGOs showed that there is scope for institutions that do not have a profit maximization objective to widen access and innovate. Non-governmenttal organizations like cooperatives are cause and values driven which provides an ideological and ethical basis for their work. In Sierra Leone, they took the lead in providing appropriate lending products and introducing innovative financial methodologies and delivery processes to address the

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[29] For example, credit unions emerged in the United Kingdom in the 1960s to meet the needs of immigrants from the Caribbean who were excluded from mainstream financial services.

particular challenges that arise in a postwar environment such as working with displaced fluid populations with no assets (Decker 2009). Over time, to enable cooperatives to play a deeper role in financial development, measures should be taken to widen their services from traditional savings and loans to include banking services and enable them to lend to meet the financing needs of small businesses.

4.5.3   Improving Information

An integral part of effective competition relates to the ability of consumers to make informed and rational choices. Therefore, the importance of reducing information asymmetries to enhance effective competition and financial intermediation cannot be overemphasized. The information problems inherent in banking are exacerbated in the postwar environment that characterizes Sierra Leone's financial sector. On the side of consumers, high levels of illiteracy and poor understanding of financial products and the formal financial system feed misconceptions and mistrust and precludes many citizens from using formal banking. On the lending side, opportunistic borrowers can exploit situations where banks have no information or poor access to information on potential borrowers' creditworthiness or on the extent of their indebtedness. Implementation of plans to establish a credit reference bureau is a welcome step in addressing the information asymmetries that act as obstacles to effective financial intermediation.

Banks should be required to provide key information in a form that makes their products easy to understand and charges and charging structures transparent and easily comparable. Apart from the requirements placed on banks, a measure that is used by the UK regulatory body the Financial Services Authority is to publish basic information booklets for consumers that provide impartial information to raise understanding of the financial system, the role of different types of financial institutions and financial products. This could be considered in Sierra Leone. Given the high levels of illiteracy in Sierra Leone, a complementary approach would be to disseminate financial information and education to the public through impartial advisers working from independent information centres. Their activities can extend to price comparisons to enhance transparency. These centres can be funded in part by banks, as part of their social responsibility agenda, and in part by the government as a public–private initiative. Other outlets that can be used to improve financial literacy include the workplace, schools and other educational and community-based organizations including faith groups. Financial education can be incorporated into the school curriculum and as part of basic literacy education. In Sierra Leone, many people fund their children's education with the expectation that these children will play a key role in providing an educated input in family decision-making and to provide a better informed platform for future generations. The budding Sierra Leone Bankers' Association can take an active role in coordinating such a venture.

4.5.4 Measuring and Regulating Competition

For any policy to be effective, monitoring, measurement and reporting are essential. Informed analysis helps regulators and policymakers to design appropriate frameworks for and make continuous improvements to policy. It is therefore important for the Bank of Sierra Leone, which currently assumes the responsibility for all aspects of financial sector policy to engage in formal competition analysis as part of its regulatory overview. An added benefit of monitoring and reporting on competition is that it will help to improve transparency. Timely identification of changes in competitive conditions will promote early corrective action and minimize the negative consequences that can arise from ineffective competition. This study provides an initial basis for exploring which competition measures may be appropriate for Sierra Leone, given the dynamics of the industry, its level of development and the institutional capacity and resources of the regulatory body, currently the Bank of Sierra Leone.

Demirgüç-Kunt and Peira (2010) have argued that multiple measures and factors should be used to measure competition. The findings of this study also support that view, as declines in concentration or lower barriers to entry do not necessarily mean that competitive conditions would improve. Structural measures have the advantage of being easy and straightforward to calculate. In addition, the required data is readily available at the Bank. While the limitations of these measures are recognized, it remains a fact that empirically, there is a tendency for high concentration to be found where there are competition problems.[30] The Panzar–Rosse H-statistic also has potential as a measure, because of its theoretical underpinnings and its ability to indicate changes in competitive conditions and bank-level data requirements. Ultimately, it is the way in which competitive pressures change the behaviour of incumbent firms that indicates the impact of competition in a market. Therefore, measurement of competition should have structural and behavioural dimensions. In this regard, monitoring price setting behaviour of individual banks, their target markets and strategies could throw light on how competition affects banking.

Banking is a multiproduct industry and competition would be different in individual submarkets. Therefore, competition should be measured in each submarket so that polices could be developed appropriately. This study has shown differences between the way in which the deposit and loan markets operate; these need to be taken into account. Loan rates could vary across locations, with interest rate spreads being higher where bank presence is low. Furthermore, government-owned banks may compete differently from other banks and charge lower rates. More reputable banks can charge higher fees,

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[30] Several factors can limit the use of concentration ratios and the Herfindahl–Hirschman Index as indicators of competitiveness. As they are based only on the number and size of existing firms, the effect of the potential competition caused by threat of entry is not captured. Also competition can be softened by product differentiation or intensified by other strategic factors.

and where customers are willing to pay more for 'quality' services or a bank's reputation, competition can be less effective. Analysis of the loan and deposit rates for individual commercial banks can shed light on the strength and speed with which policy changes affect interest spreads and direct future policy making.

The 2007–9 global financial crisis highlighted the impact of increased competition on stability and the social cost of bank failure that may arise because of too much competition.[31] Failure is a feature of all competitive markets, but the extent of the social costs in banking call for a balance between competition and stability. In recognition of this, the Sierra Leone authorities have tightened prudential regulation, largely by increasing capital requirements as entry barriers were lowered. The existence of cooperative financial institutions in the system can also help foster stability. The performance of cooperatives in the recent global financial crisis suggests that they may be more resilient than private sector banks. Birchall and Ketilson (2009) found that cooperatives increased assets, deposit and membership levels during the crisis. Hesse and Cihak (2007) also found that cooperatives are more stable than commercial banks.

Sierra Leone does not have a deposit insurance scheme in place to protect small depositors and create a safety net in terms of crisis. The feasibility of introducing such a scheme in Sierra Leone in the short-term needs to be considered carefully because of the moral hazard problems, their funding and management and the need for speed and unambiguity in their deployment. In terms of stability, there is a growing consensus that it is in the area of exit and crisis resolution policies that African countries are weakest. Banks and the regulator could prepare explicit recovery and resolution plans to ensure orderly exit. The aim is to minimize collateral damage to the wider financial system especially where banks are considered as 'too big to fail'. Resolution and wind-up plans need to be outlined by the regulator. These can be put in place when a troubled bank does not meet all threshold conditions even though they may not be insolvent. In the case of Sierra Leone there will be a need for clear allocation of responsibilities between home and host country regulators in addition to outlining resolution options such as mergers with private banks or nationalization. Where banks outline their plans for recovery and resolution, these plans are known as 'living wills'. Writing of living wills would be advisable for large and complex banks that are of systemic importance. Bank regulation and supervision, generally, is a highly resource intensive activity and given that the Bank of Sierra Leone's current capacity is rather limited, there is a need for continued investment in capacity building.

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[31] In the literature, the competition–fragility view posits that too much competition can be destructive, detrimental to stability and lead to financial crises (Allen and Gale 2004; OECD 2010; Vives 2010). On the other hand, the competition–stability argument argues that competition drives down loan rates which in turn induces borrowers to undertake less risky investments (Boyd and De Nicolo 2005).

4.6   Conclusions

This study has discussed structural changes in the Sierra Leone banking sector, evaluated competitive conditions in Sierra Leone banking using structural measures and the Panzar–Rosse test and outlined policy considerations in the area of banking competition. The key findings are that competitive conditions are evolving and that an increase in the number of competitors alone cannot result in effective competition. The balance of evidence leads to the conclusion that banks in Sierra Leone banks appear to earn profits under conditions of monopolistic competition. Furthermore, it appears that some of the competitive pressures arising from new entry may have dissipated, after the foreign banks had gained a reasonable amount of market share and established a basis for strengthening market power.

This study has provided a platform for studying a hitherto unexplored aspect of Sierra Leone banking. While it has provided a basis for future studies it has not been without limitations and many important issues remain to be addressed. Directions for future study include the impact of increased competition on lending practices and credit allocation, especially on credit access to SMEs. It would also be worthwhile to investigate whether foreign banks practise cream-skimming in Sierra Leone. The impact, if any, of changes in competition on bank efficiency is another important direction for future research. Further work needs to be done to explore the application of a dynamic estimation technique to the Panzar–Rosse test and also evaluate other measures such as the Lerner Index, persistence of profits and the Bresnahan–Lau approach to measuring competitive conditions in Sierra Leone.

Policy recommendations arising from the study are that there is a need for an explicit and holistic competition policy that incorporates structural as well as behavioural dimensions.

More effective competition requires a more nuanced consideration of the characteristics of new entrants and their entry strategies, encouraging new types of financial services providers, improving education to consumers and information for both consumers and banks and undertaking competition analysis for supervision and regulatory purposes. The challenge is to find a fine balance between competition, concentration, stability, profitability and efficient intermediation.

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