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Bank concentration, country income and financial development in SADC

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ABSTRACT

The varying levels of financial development in the Southern African Development Community (SADC), with South Africa at the upper end and most countries at the lower end, clearly reflect elements of concentration of financial development in the region. This study reflects on a number of empirical tests conducted around the issue of bank concentration within the SADC region. The Herfindahl-Hirschman Index reveals a high level of concentration of bank assets in SADC, which drastically reduces when South Africa is excluded. The result implies that bank assets in SADC are concentrated in South Africa, but fairly distributed across other countries. Panel Dynamic Fixed and Random Effects models have established that bank concentration constrains development of the financial sectors in all SADC countries, regardless of income level, although the effect is highly significant in low-income countries. The study also established mixed and opposing effects of South Africa's financial development on bank concentration in SADC. The findings suggest that the expansion and diversification of the banking sectors can enhance financial development in SADC countries. Further, South Africa's banking institutions that are expanding to other SADC countries are either part of the large and dominant few or do not have an impact on bank concentration in these countries.

Key words: financial concentration, financial market development, SADC, South Africa

Introduction

The extent to which a financial sector is controlled by a few larger institutions in the market, as defined by market shares, reflects financial market concentration

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(IMF and World Bank 2005). Studies on financial concentration in the Southern African Development Community (SADC)[1] are focused on concentration within countries and mostly in the banking sector, with no consideration of effects across countries or on financial development. Literature is not clear on the relationship between bank concentration and financial development in the SADC region. This notwithstanding, the varying levels of financial development, with South Africa at the upper end and most countries at the lower end, clearly reflect elements of the concentration of financial development in the region.

The level of concentration of the financial sector in SADC has not been empirically determined, nor has the level of concentration among other SADC countries when South Africa is excluded. The manner in which bank concentration within countries affects their capacity to develop their financial sectors has as yet not been empirically examined, nor has the way in which these effects vary with the country's level of income. Furthermore, the literature has not empirically evaluated how South Africa's banking institutions, which are spread across regional countries, affect the level of bank concentration in these countries.

There are divergent arguments for and against bank concentration. In developing countries, concentration in the financial industry compromises efficiency in intermediation, bank competitiveness, and policies and regulations (Demirguc-Kunt & Levine 2000). In addition, institutional concentration affects the effectiveness of central banks, as the market power of individual institutions and the interdependence of institutions and markets increase. By contrast, economies of scale drive bank mergers and acquisitions, so that increased concentration goes hand in hand with efficiency improvement growth (Demirguc-Kunt & Levine 2000).

This study performs a number of empirical estimates around the issue of bank concentration in the SADC region. First, the study establishes the level of concentration of bank assets in SADC and in other SADC countries excluding South Africa. Second, the study estimates the effects of bank concentration on financial development in the SADC countries, and how these effects vary with the level of income in a country. Third, the study evaluates the effects of South Africa's financial development on bank concentration in other SADC countries.

The study findings suggest that bank assets in SADC are concentrated in South Africa, but fairly distributed across other SADC countries, excluding South Africa. The results also suggest the need for the expansion and diversification of the banking sectors in the SADC region, as concentration brings inequality which retards financial development. In addition, South Africa's financial institutions that are expanding to other SADC countries are either part of the large and dominant few or do not have an impact on bank concentration in these countries.

This article is structured as follows: section 2 presents a review of the literature, with section 3 covering the research methodology and data. Section 4 presents the research findings and the article ends with section 5, which concludes the study.

Literature review

In financial markets, concentration is defined as the degree to which the financial sector is controlled by the bigger institutions, as defined by market shares (IMF and World Bank 2005). In the banking sector, for example, the *bank concentration ratio* measures the market share of the top three banks in the system in terms of assets, deposits or number of branches (IMF 2004). Concentrated financial markets have a few large suppliers (Cetorelli, Hirtle, Morgan, Peristiani & Santos 2007).

Concentration in the financial sector also has a spatial dimension, where there are differences in respect of focus and levels of sophistication of the banking institutions across a country's cities/administrative regions, or across countries within a regional economic bloc. Spatial concentration measures the geographical distribution of a sector in a territory (Ceapraz 2008). A specific industry is considered 'concentrated' if the bulk of its production (or service) is carried out in a reduced number of areas/countries within the same country/region (Ceapraz 2008). Spatial concentration is extensively used in economics, particularly in urban economics, economic geography and international trade, as there is more emphasis on geographical space in these areas (Campante & Quoc-Anh 2008). Factors that determine spatial concentration in the financial industry revolve around agglomeration effects, externalities and the benefits of clustering an industry. Spatial concentration in the financial sector emphasises the importance of local embeddedness, networks, face-to-face communication, knowledge spill-overs and spatial proximity (Palmberg 2012). The expansion of banks into other financial activities also contributes to concentration in the sector (D'Arista 2009).

In the financial sector, concentration can be institutional, where a few institutions account for a high proportion of the resources of any given sector, or asset concentration (D'Arista 2009). Concentration in the financial industry has implications for financial sector efficiencies, bank stability, industrial competitiveness, policies and regulations (Demirguc-Kunt & Levine 2000).

Bank concentration comprises benefits as well as costs in the development of the financial sector, and this dilemma has provoked contrasting opinions on the effects of concentration in financial sectors. On the one hand, bank concentration intensifies market power and thereby stalls competition and efficiency (Demirguc-Kunt & Levine 2000). Concentration in the credit market introduces inefficiencies

that reduce access to credit, thus hindering growth (Law & Abdullah 2006). Failure to curb concentration undermines systemic efficiency through a reduction in credit availability, the uneven distribution of credit, a decline in support for small innovative companies and has negative implications for the conduct of monetary policy (D'Arista 2009).

On the other hand, economies of scale drive bank mergers and acquisitions, which improve efficiency (Demirguc-Kunt & Levine 2000). Some degree of monopoly power in banking, brought on by institutional concentration, is both natural and beneficial (Law & Abdullah 2006).

Globally, concentration in financial markets is evident. The world over, financial sectors are characterised both by globalisation and by spatial relationships and local embeddedness (Agnes 2000). In 2009, the ten largest stock exchanges in the world accounted for 86% of the total value of shares traded (World Federation of Exchanges 2011). This spatial concentration of the financial sector is also evident in the financial sectors of trade blocs and economic unions, as well as in-country financial sectors (Palmberg 2012).

Studies on concentration in the financial sector focus more on the effect such concentration has on the financial stability, efficiency and competiveness of the banking sector. D'Arista (2009) observes that in the United States the top ten banks accounted for 26% of total assets in 1984, but in 2008 five banks were controlling 97% of the total assets. Law and Abdullah (2006) evaluated the effect of bank concentration on financial development using a cross-country analysis of 68 economies. Their results suggest that concentration in the banking industry is positively associated with financial development in lower middle- and low-income countries. Demirgüç-Kunt and Levine (2005) found no support for the view that concentration increases the fragility of banks. Fiordelisi and Cipollini (2009), who found bank concentration to have a positive effect on financial distress, had examined the commercial banks of 25 European Union countries. The findings by Bikker and Groeneveld (1998) support the conventional view that concentration impairs competitiveness and may eventually result in an undesirable exercise of market power by banks.

A number of studies have been conducted on bank concentration in SADC. The results of Kassim's (2010) study show no significant influence of concentration on four measures of credit risk-taking behaviour in 138 SADC commercial banks. Okeahalam (2002) found that the banking sector in the Common Monetary Area (CMA) in southern Africa is highly concentrated. Literature, such as that of Okeahalam (2002), Beck, Demirgüç-Kunt and Levine (2003) and the Organisation for Economic Cooperation and Development (OECD) (2010) on concentration in SADC countries, however, mainly focus on the banking service in South Africa.

For example, the banking sector in this country was found to be highly concentrated (Okeahalam 2002; Beck, Demirgüç-Kunt & Levine 2003; Ben-Zekry 2007). The International Monetary Fund (IMF) estimates that the level of bank concentration in South Africa was 77% in 2011, while the OECD (2010) found that the commercial and retail banking industries in South Africa have been highly concentrated since the early 1990s. According to Okeahalam (2009), the aggregate income in a municipal area is a significant determinant of the spatial distribution of bank branches in South Africa.

Falkena, Davel, Hawkins, Llewellyn, Luus, Masilela, Parr, Pienaar and Shaw (2004), who used the Herfindahl-Hirschman Index (HHI) to determine the concentration in the banking sector in South Africa, found that it is highly concentrated. The same in-country approach employed to empirically evaluate bank concentration can also be used to assess bank concentration in the SADC region. Given the dominance of South Africa in terms of financial development, the *a priori* expectations are that banking assets are highly concentrated in this country. However, South African banking institutions are expanding into other countries, and financial sectors are developing in countries such as Mauritius, Botswana, Angola and Namibia. In the process financial concentration is likely to be diluted.

Methodology and data

Measuring bank asset concentration

Many ratios are used to measure concentration, including the k bank Concentration Ratio (k-CR); the Herfindahl-Hirschman Index (HHI); the Hall-Tideman Index (HTI); the Rosenbluth Index (RI); the Comprehensive Industrial Concentration Index (CCI); the Hannah and Kay Index (HKI); the U Index (U); the multiplicative Hause Index (Hm); the additive Hause Index (Ha); and the Entropy measure (E) (Bikker & Haaf 2002). Of these ratios, only the HHI is discussed and the rationale is explained below.

The HHI, which is the most widely used measure of concentration in the theoretical literature, often serves as a benchmark for evaluating other concentration indices (Bikker & Haaf 2002). The HHI is a widely respected barometer for measuring market concentration in a banking system (SARB 2011). The IMF (2013) also notes that a more sophisticated measure of concentration is the HHI, which is the sum of squares of the market shares of all firms in a sector. The HHI represents the reference market power index in the antitrust authority guidelines when evaluating

mergers and acquisitions (M&As) in the United States (Ciapanna & Rondinelli 2011). Ceapraz (2008) used the HHI to assess concentration in Brazil.

The HHI

In this study, the HHI represents the sum of the squared sizes of all banking sector assets in the SADC region, where the total banking assets of each country are expressed as a proportion of total banking assets in the SADC region. The index is defined as:

$$HHI = \sum_{i=1}^{n} \left(\frac{s_i}{S}\right)^2 \qquad 1 \geq \text{HHI} \geq \frac{1}{\text{n}}. \tag{1}$$

where S is the combined size of all of the bank assets in the region, s_i is the size of the i^{th} country's banking sector (measured by bank assets in that country), and there are n countries. This approach of measuring concentration has elements of spatial distribution in it, as bank assets for individual countries are used. As such, the concentration obtained by the method shows the spread of banking assets across countries in SADC and not necessarily the assets of the top three banks in SADC.

Dynamic Panel models

Beyond testing the levels of concentration of bank assets in the SADC countries, this study also evaluates the relationship between bank concentration and financial development, as captured in the models below.

Financial Development – Bank Concentration Model

The objective is to analyse whether bank concentration affects the level of financial development in the SADC region. To this end, a dynamic panel model is used to assess the relationship. Consider the model below:

$$FD_{it} = \beta_1 + \beta_2 FD_{it-1} + \beta_3 GGDPPC_{it} + \beta_4 TO_{i,t} + \beta_5 FO_{it} + \beta_6 RIR_{i,t} + \varepsilon_{it} \tag{2}$$

where BC is bank concentration (as measured by the k-bank concentration ratio), FD is financial development (as measured by four variables, namely domestic credit, liquid liabilities, bank credit to private sector and broad money). GGDPPC is growth in real GDP per capita, RINT is real interest rate, and TO & FO are

trade and financial openness, respectively. Law and Abdullah (2006) assessed the role of country income on the relationship between bank concentration and financial development. In this study, the effects of bank concentration on financial development at different levels of income are estimated by the interaction term between bank concentration and a dummy variable for country income. As such, equation (2) is transformed to:

$$FD_{it} = \beta_1 + \beta_2 FD_{it-1} + \beta_3 GGDPPC_{it} + \beta_4 TO_{i,t} + \beta_5 FO_{it} + \beta_6 RIR_{i,t} + \beta_7 (BC_{it} * MIC) + \beta_8 (BC_{it} * LIC) + \varepsilon_{it} \quad (3)$$

where MIC and LIC are the dummy variables of middle- and low-income countries respectively.

SADC Bank Concentration and Financial Development in SA model

This study also performs empirical tests on the effect of financial development in South Africa in respect of financial concentration in the SADC region. The assumption is that as South Africa's financial sector grows and expands into the region, through branches and institutions, it dilutes the level of concentration of financial sectors in the recipient countries. The expectation is that financial development variables for South Africa are negatively related to financial concentration in SADC. The tests involve running panel estimations with bank concentration as the dependent variable.

Two new variables, foreign banks to total banks and bank returns on assets, are introduced as control variables in addition to growth in real GDP per capita, trade and financial openness and real interest rates. The expectation is that the establishment of more foreign banks (particularly fully fledged banks) implies a higher number of banks in that country and this dilutes the country's bank concentration. With return on assets, high returns attract other players to the industry, thereby diluting the concentration.

In this model, financial development variables for South Africa will be as follows:

$$BC_{it} = \beta_1 + \beta_2 BC_{it-1} + \beta_3 GGDPPC_{it} + \beta_4 FO_{it} + \beta_5 FB_{i,t} + \beta_6 ROA_{i,t} + \beta_7 DCSA_{it} + \beta_8 LLSA_{it} + \beta_9 BCPSA_{it} + \beta_{10} M2SA_{it} + \varepsilon_{it} \quad (4)$$

where BC is bank concentration, GGDPPC is growth in real GDP per capita and FO is financial openness. FB is the proportion of foreign banks and ROA the return on assets. DCSA is domestic credit in South Africa, LLSA is liquid liabilities, whilst BCPSA is bank credit to the private sector and M2 is broad money.

Data and variables

This study uses annual data for 15 SADC countries, spanning the period 1985–2014. Data were obtained from the World Bank (2016a) World Development Indicators and the Global Financial Development Database. The variables used to measure bank concentration and financial development empirical tests are presented in Table 1.

Table 1: Variables description

Variable category	Variable	Description	Definition
Dependent variables	DC	Domestic credit	Total credit by the financial sector in SADC countries
	LL	Liquid liabilities	M3/GDP in SADC countries
	BCP	Bank credit to private sector	Total credit by banks to private sector in SADC countries
	M2	Broad money	Broad money to GDP in other SADC countries
Control variables	GGDPPC	Growth in real gross domestic product per capita (GDPPC)	Growth in real gross domestic product per capita
	TO	Trade openness	(Exports + imports)/GDP for other SADC countries
	FO	Financial openness	Chin Index of Financial Openness for SADC countries
	RINT	Real interest rate	Real interest rate for SADC countries
	FB	Foreign banks	Proportion of foreign banks to total banks in the country
	ROA	Return on assets	Banks's average return on assets in a country
Concentration	BC	Bank concentration	Proportion of total assets of the top three banks in a country to total banking assets in that country
Income variables	MIC	Middle-income countries	Dummy for SADC countries classified by the World Bank as middle income in 2015.
	LIC	Low-income countries	Dummy for SADC countries classified by the World Bank as low income in 2015.

Source: Author's computations

The study uses the three-bank concentration ratio of the World Bank to measure bank concentration in SADC. This ratio measures the market share of the top

three banks in the system in terms of assets, deposits or number of branches (IMF 2004). It is important to note that when SADC is regarded as one market, the value of bank assets varies across countries and this reflects the market share that each country has in SADC. The distribution of these assets across countries in the SADC region could be regarded, for the purposes of this study, as a crude indication of how banking is spread around SADC countries. The study empirically tests how this concentration changes when South Africa is excluded, and empirically evaluates how bank concentration affects financial development in the region.

A priori expectations are that bank concentration has a negative effect on financial development, given that most countries with underdeveloped financial sectors have high levels of bank concentration.

The variables used to measure financial development also require some justification. The rationale is that what represents an appropriate measure of financial development proved to be controversial in the literature (Ghirmay 2004). Variables used in the literature capture the degree of financial intermediation, the efficiency of the financial sector, the monetisation of the financial system, the role of commercial banks in allocating funds and the relative importance of the stock market (Lawrence & Longjam 2003). In this study, domestic credit (DC), liquid liabilities (LL), bank credit to private sector (BCP) and broad money (M2) are used as proxies for financial development.

Domestic credit captures the full degree of intermediation in developing countries, as governments – which provide infrastructure for economic development – often borrow from the financial markets (Adusei 2012). Government borrowing not only affects credit to other sectors in domestic markets, but also often invites government interference in the markets.

Bank credit to private sector is often used as a proxy for measuring financial development in the literature as it represents an accurate indicator of the quantity and quality of investment (Beck et al. 2000). Liquid liabilities consist of currency held outside the banking system plus the interest-bearing total deposit liabilities of banks and other financial institutions. It reflects the overall size of the financial intermediary sector in a country. Broad money is traditionally used as an indicator for financial deepening (King & Levine 1993).

A priori expectations are that financial development reduces levels of bank concentration; as such the coefficients for all measures of financial development are expected to be negative. Real GDP per capita growth represents average income per person, reflects the demand for banking services and is expected to have a negative effect on concentration. As regards trade and financial openness, the more open an economy is to finance the more competition it generates in the market, and the more

investment and assets flow to the banking sector and the more institutions can be established. Real interest rates are expected to have positive coefficients, implying they support financial development in SADC. The diagnostic tests for the variables in terms of the correlation and panel stationarity test appear in Annexure 1.

The study also investigates how the effects of bank concentration on financial development vary with income levels. As such, the study introduces variables to capture the level of development or income level of countries as classified by the World Bank. In 2015, the World Bank (2016b) classified Angola, Botswana, Namibia, Mauritius and South Africa as middle income, with the remaining SADC countries being classified as low-income countries.

Empirical findings

This section presents a number of results. First to be presented are the results of the HHI for financial concentration in SADC. Two HHI indices were constructed, with the first being for all SADC countries and the second for other SADC countries excluding South Africa. Second, this section presents estimation results of how bank concentration affects financial development in SADC countries. The estimations further evaluate how the effects vary with a country's level of development (income level). Third, the section presents the results of the effects of South Africa's financial development on the financial concentration of other SADC countries. However, before these results, the section presents multicollinearity and stationarity test results for the variables.

The HHI for financial concentration in SADC

The HHI is calculated first for all SADC countries and then for other SADC countries excluding South Africa. The rationale is to investigate how banking assets are spread in SADC with and without South Africa. The gap between the indices could be taken to indicate South Africa's contribution to or dominance of the banking sector in the region. Figure 1 shows the HHI in the banking sector of SADC as a region for each year from 1985 to 2014.

Figure 1 shows that concentration in SADC's banking sector as a whole is generally high, although the level of concentration has been on a gradual decline, partly as a result of financial development in other SADC countries outside South Africa, as well as the further diversification and development of non-banking sectors across SADC. When South Africa is excluded, the level of concentration in the region declines significantly, indicating a fair distribution of banking assets among other

SADC countries. The low levels of the HHI obtained for other SADC countries excluding South Africa do not, however, indicate low bank concentration within individual countries.

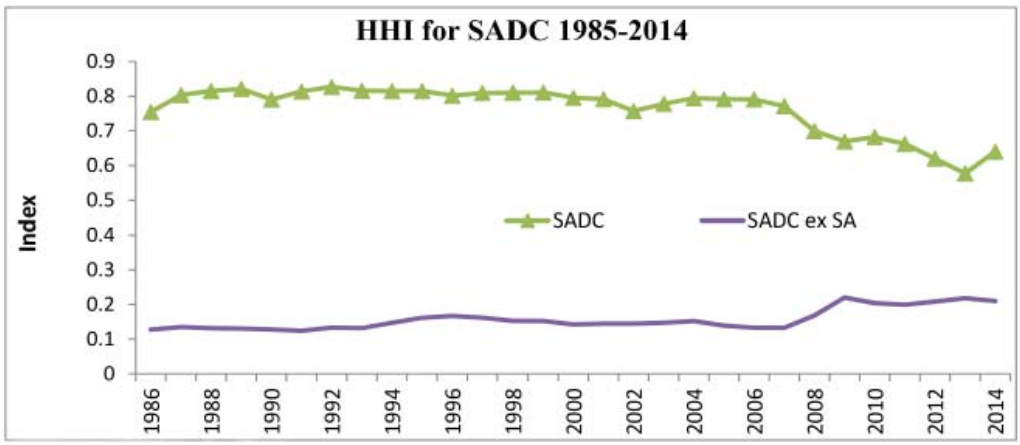


Figure 1: HHI for SADC

Data source: World Bank (2016a)

Bank concentration remains high in most countries, but when pooled together, South Africa's effect becomes significant. When the country is dropped, the average is significantly reduced. The level of concentration, however, slowly increases as shown by a marginal increase in the index especially after 2006, which is indicative of emerging financially developed countries in SADC. Their emergence is also evident in the drop in overall concentration level for the region. The decline in SADC's total banking assets concentration could, however, also remotely be attributed to the effects of the global financial crisis of 2007 that affected South Africa, though growth in the assets of some banks (e.g. Capitec) contradict the argument. The global economic crisis triggered an economic recession in South Africa, in 2009, which affected consumer affordability, spending patterns, uptake and the servicing of debt (Banking Association South Africa 2010). The economic recession resulted in an increase in non-performing loans, which had a significant impact on the banks' loan books, causing total assets and liabilities declined (Maredza & Ikhide 2013). Indicatively, growth in total bank assets in South Africa has slowed to below three per cent since 2012 (Banking Association South Africa 2014).

The study further investigates how bank concentration affects financial development in SADC. The assumption is that a high level of bank concentration within a country constrains financial development, given that economies that are financially advanced have low levels of concentration in their financial sectors.

Bank concentration and financial development

Table 2 presents the results of the effects of bank concentration on financial development in SADC countries.

Table 2: Dynamic fixed effects

Variable		Domestic credit	Liquid liability	Private credit	Broad money
Constant		19.693 (0.0007)***	14.237 (0.0000)***	13.689 (0.0000)***	0.2019 (0.0001)***
Financial development (-1)		0.8059 (0.0000)***	0.8241 (0.0000)***	0.7464 (0.0000)***	0.6358 (0.0000)***
GGDPPC		-0.2028 (0.1014)	-0.1734 (0.0002)***	-0.1471 (0.0131)**	-0.0043 (0.0001)***
Trade openness		-0.0224 (0.3568)	0.0017 (0.8601)	0.0138 (0.2337)	0.0005 (0.7806)
Financial openness		1.1121 (0.1229)	0.2795 (0.3087)	0.9377 (0.0081)***	0.0095 (0.7806)
Real interest rates		-0.0483 (0.0519)*	-0.0130 (0.1672)	-0.0022 (0.8510)	-0.0003 (0.1322)
Bank concentration		-0.1018 (0.0642)*	-0.0843 (0.0002)***	-0.0914 (0.0010)***	-0.0006 (0.1531)
Diagnostic tests	*R-sqd*	*0.9584*	*0.9570*	*0.9345*	*0.8639*
	Adj. R-sqd	*0.9564*	*0.9549*	*0.9314*	*0.8573*
	F-stat	*477.876*	*452.43*	*295.6302*	*131.435*
	Prob. (F)	*0.0000*	*0.0000*	*0.0000*	*0.0000*

* t-statistic (probability); ***, **, * significant at 1%, 5% and 10% levels respectively

Source: Author's computations

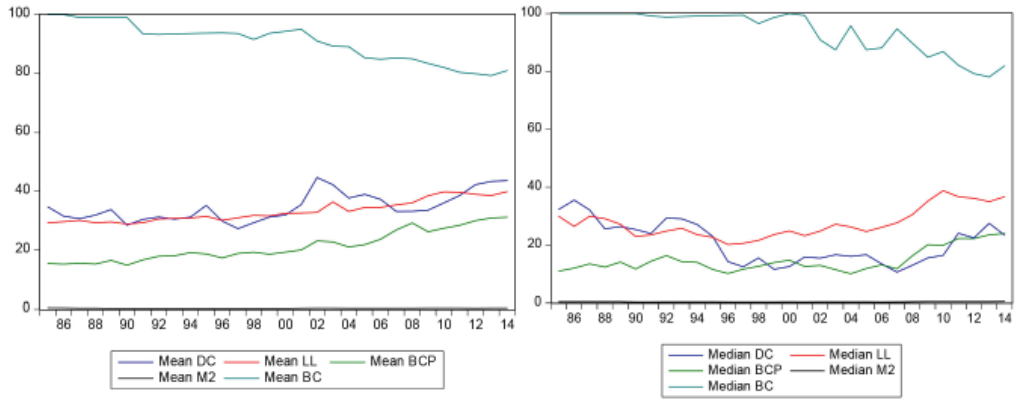
The results show that concentration has a negative effect on financial development across all measures. The coefficients of bank concentration are negative and statistically significant across all measures of financial development. It is only under broad money where the coefficient is not statistically significant, although it remains negative.

The results support the theoretical argument that concentration reduces financial sector development and this is in line with the findings of Levine (2001) and Demirgüç-Kunt and Levine (2000). The results further align with the implications of findings by Căpraru and Andrieş (2015) that increased concentration has a negative impact

on financial stability, which is a necessary condition for financial development. The results, however, contradict those of Ratti, Lee and Seol (2008), who found that in a highly concentrated banking sector firms are less financially constrained. As mentioned earlier, bank concentration constraints limit the development of financial sectors.

The coefficients of lagged dependent variables across all measures of financial development are high and significant – evidence of strong dependence on past years' value. Economic growth, as measured by growth in GDP per capita, is negatively related to all the proxies for financial development – a result which is consistent with the findings of Phakedi (2014), Allen and Ndikumana (1998) and Le Roux and Moyo (2015). Trade openness has an insignificant effect on financial development in SADC, a result that is contrary to expectations. Financial openness strongly supports the movement of private credit in SADC and has an insignificant effect across other variables. Real interest rate has a negative relationship with financial development in SADC and its effects are significant in domestic credit.

The study has established the trend relationship between concentration and financial development variables from 1985 to 2014 (see Figure 2).



Figures (2a): Mean and **(2b)** median of bank concentration and financial development

Data source: World Bank (2016a)

The observable trend between bank concentration and financial development shows an inverse relationship. Concentration in SADC started to fall in the 1990s when most countries liberalised their financial sectors. Correspondingly, financial

development started to improve as the sectors expanded, restrictions were removed and more institutions were established. The correlation coefficients between bank concentration and financial development measures (domestic credit, liquid liability and private credit) estimated by the study are negative at -0.06; -0.05 and -0.14 respectively, indicting an inverse relationship.

The results indicate that in the SADC region, having a concentrated financial sector constrains development of the sector. Implicitly, the results suggest that diversification and competition in the financial sector enhance the development of the financial sectors in SADC. The results could be supported by the argument that despite the presence of a few large banks, the financial sectors in most SADC countries lack depth and efficiency, and have high levels of financial exclusion. In addition, in some cases, although financial liberalisation removed barriers to entry in the financial sector, existing banks used their competitive edge to create market structures that constrain the development of new banks. Most SADC countries have financial sectors that are dominated by a few strong banks, but remain relatively underdeveloped as there are no economies of scale and efficiency that, in theory, come with such financial structures.

Given the varying levels of income, and economic and financial development in the SADC region, there is a need to ascertain whether the negative relationship between bank concentration and financial development is influenced by a country's income level. Below is an analysis of how country income levels affect financial development and the relationship between concentration and financial development.

Income, concentration and financial development

To test the effect of income level on the relationship between bank concentration and financial development, this study carries out two analyses. First, the study introduces a dummy for income level and interacts it with financial development measures in different estimation models. Second, as a robustness check, the study groups countries according to their levels of income, as classified by the World Bank, and runs separate models for each group.

Table 3 shows the results of how the income level of a country, introduced as a dummy, matters in terms of financial development in SADC.

The level of income has a positive effect on financial development and the result is consistent across all measures. For example, under domestic credit, middle-income

Table 3: Country income level and financial development

Variable		Domestic credit	Liquid liability	Private credit	Broad money
Financial development (-1)		0.9709 (0.0000) ***	0.9690 (0.0000)***	0.9471 (0.0000)***	0.7554 (0.0000)***
GGDPPC		-0.0582 (0.6331)	-0.1139 (0.0152)**	-0.0470 (0.4204)	-0.0035 (0.0014)***
Trade openness		-0.0212 (0.1197)	0.0012 (0.8204)	0.0043 (0.5043)	0.0003 (0.0061)***
Financial openness		0.6346 (0.1519)	0.4664 (0.0099)***	0.3350 (0.1176)	0.0192 (0.0000)***
Real interest rates		-0.0066 (0.7558)	0.0018 (0.8246)	0.0100 (0.3378)	-0.00008 (0.6679)
Dummy middle-income countries		5.2913 (0.0047)***	2.3993 (0.0017)***	2.8359 (0.0051)***	0.1096 (0.0000)***
Dummy low-income countries		2.9927 (0.0560)*	1.3773 (0.0250)**	0.7166 (0.3289)	0.0539 (0.0002)***
Diagnostic tests	*R-sqd*	*0.952608*	*0.952608*	*0.925598*	*0.833789*
	Adj.R-sqd	*0.951944*	*0.951944*	*0.924555*	*0.831459*

Source: Author's computations

countries make a higher contribution to financial development in SADC than low-income countries. The coefficient for the former is at 5.29 and for the latter at 2.99. Implicitly, this result indicates that the former makes a net additional contribution of 2.3 to financial development in SADC. The large coefficients across all the measures of financial development indicate that middle-income countries are highly receptive to financial development while low-income countries are not. As such, income levels matter in respect of financial development.

When the dummy variables for country income levels are interacted with bank concentration, the results show the persistently negative effects of bank concentration on financial development, and the effect is higher in middle- than in low-income countries (see Table 4).

Table 4: Concentration, income level and financial development

Variable		Domestic credit	Liquid liability	Private credit	Broad money
Financial development (-1)		0.7922 (0.0000)***	0.8182 (0.0000)***	0.7113 (0.0000)***	0.6330 (0.0000)***
GGDPPC		-0.1822 (0.1409)	-0.1707 (0.0003)***	-0.1361 (0.0205)**	-0.0042 (0.0001)***
Trade openness		-0.0175 (0.4704)	0.0027 (0.7794)	0.0181 (0.1174)	0.00007 (0.7326)
Financial openness		0.6618 (0.3799)	0.2220 (0.4436)	0.6817 (0.0580)*	0.0079 (0.2307)
Real interest rates		-0.0466 (0.0597)	-0.0127 (0.1760)	0.0002 (0.9806)	-0.0003 (0.1462)
Bank concentration in middle-income countries		-0.2833 (0.0087)***	-0.1089 (0.0164)**	-0.2379 (0.0000)***	-0.0013 (0.1469)
Bank concentration in low-income countries		-0.0468 (0.4456)	-0.0788 (0.0010)***	-0.0578 (0.0500)*	-0.0004 (0.3741)
Diagnostic tests	*R-sqd*	*0.9422*	*0.9585*	*0.9360*	*0.8641*
	Adj. R-sqd	*0.9392*	*0.9564*	*0.9327*	*0.8572*
	F-stat	*320.636*	*454.469*	*287.670*	*125.117*
	Prob. (F)	*0.0000*	*0.0000*	*0.0000*	*0.0000*

Source: Author's computations

The results suggest that concentration inhibits development of the financial sectors in all SADC countries, regardless of income level. The effect of bank concentration is, however, more pronounced in middle- than in low-income countries, given the size of the negative coefficients and the high number of statistically significant coefficients for middle-income countries. The results contradict the findings of Law and Abdulla (2006), who found a positive association between concentration and financial development in lower middle- and low-income countries.

Results of estimations with country income groups separated

The study tested the results for robustness by running estimations for middle- and low-income countries separately (Tables 5 and 6). The separation of the countries is meant to address possible pulling effects caused by the inclusion of countries with different income levels in one model.

The results in Table 5 show that bank concentration has no effect on financial development in middle-income countries, as the coefficients are not statistically significant. Concentration, however, has a negative sign for domestic credit, liquid liabilities and private credit. The results contradict those obtained when all countries were included in the model.

Table 5: Concentration and financial development in middle-income countries

Variable		Domestic credit	Liquid liability	Private credit	Broad money
Constant		18.722 (0.1220)	10.646 (0.0783)*	11.717 (0.0133)**	0.0319 (0.5763)
Financial development (-1)		0.7965 (0.0000)***	0.8483 (0.0000)***	0.8875 (0.0000)***	0.8657 (0.0000)***
GGDPPC		0.0627 (0.7609)	-0.0176 (0.7961)	0.0088 (0.8913)	0.0005 (0.5461)
Trade openness		-0.0103 (0.8489)	-0.0038 (0.8314)	-0.0090 (0.5972)	0.00004 (0.8397)
Financial openness		3.7399 (0.0074)***	0.8837 (0.0426)**	1.0781 (0.0146)**	0.0124 (0.0331)**
Real interest rates		0.0985 (0.1081)	0.0444 (0.0281)**	0.0303 (0.1141)	0.0004 (0.0718)*
Bank concentration in middle-income countries		-0.0570 (0.6386)	-0.0307 (0.5230)	-0.0585 (0.1640)	0.0004 (0.3927)
Diagnostic tests	*R-sqd*	*0.9732*	*0.9755*	*0.9828*	*0.9647*
	Adj. R-sqd	*0.9712*	*0.9737*	*0.9815*	*0.9621*
	F-stat	*487.03*	*534.56*	*766.55*	*366.75*
	Prob. (F)	0.0000	0.0000	0.0000	0.0000
	Observations	*150*	*150*	*150*	*150*

* t-statistic (probability); ***. **, * significant at 1%, 5% and 10% levels respectively

Source: Author's computations

The 'no effect' result shown in Table 5 is, however, closer to findings by Beck et al. (2003) and Demirgüç-Kunt and Levine (2000) of the weak effect of bank concentration on financial development. The rationale could be that for high-income countries, concentration does not matter much as the few banks dominating the market and the developed non-bank financial sectors are able to support financial development.

The results for low-income countries (Table 6) show that bank concentration also has a negative effect on all measures of financial development, and the coefficients for liquid liabilities and private credit are statistically significant at one per cent.

Table 6: Concentration and financial development in low-income countries

Variable		Domestic credit	Liquid liability	Private credit	Broad money
Constant		17.364 0.0080)***	14.548 (0.0000)***	13.883 (0.0001)***	0.1899 (0.0048)***
Financial development (-1)		0.7156 0.0000)***	0.7981 (0.0000)***	0.4668 (0.0000)***	0.6087 (0.0000)***
GGDPPC		-0.3266 (0.0358)**	-0.2401 (0.0001)***	-0.2463 (0.0020)***	-0.0061 (0.0001)***
Trade openness		-0.0159 (0.5513)	0.0066 (0.5774)	0.0378 (0.0068)***	0.00004 (0.8830)
Financial openness		-1.3681 (0.1733)	-0.0711 (0.8594)	-0.1436 (0.7633)	-0.0007 (0.9392)
Real interest rates		-0.0766 (0.0044)***	-0.0249 (0.0230)**	0.0022 (0.8714)	-0.0004 (0.1103)
Bank concentration in low-income countries		-0.0865 (0.1580)	-0.0947 (0.0003)***	-0.1075 (0.0010)***	-0.0007 .5(0.2247)
Diagnostic tests	*R-sqd*	*0.8540*	*0.9369*	*0.6690*	*0.7996*
	Adj. R-sqd	*0.8461*	*0.9334*	*0.6509*	*0.7886*
	F-stat	*106.92*	*271.356*	*36.927*	*72.885*
	Prob. (F)	*0.0000*	*0.0000*	*0.0000*	*0.0000*
	Observations	*300*	*300*	*300*	*300*

* t-statistic (probability); ***. **, * significant at 1%, 5% and 10% levels respectively

Source: Author's computations

The results imply that in low-income countries, the level of concentration is a major determinant of financial development. The results are consistent with dynamic panel estimations that used dummy and interactive dummy variables (Tables 3 and 4) in terms of the negative effect, although the magnitude is now marginally higher.

Indicatively, the results in Tables 3 and 4 are seemingly affected by the pulling effect of a country's level of income. When the countries were modelled together, the negative effect on financial development contributed by middle-income countries was higher than the contribution of low-income countries. However, when the countries were separated (Tables 5 and 6), concentration in low-income countries had a stronger negative effect on financial development than in middle-income countries. The overall result, therefore, supports deductions by Law and Abdullah (2006) that the effect of bank concentration on financial development is subject to the level of economic development.

Financial development in South Africa and bank concentration in SADC

The study also estimates the effect of South Africa's financial development on bank concentration in SADC (see Table 7).

Table 7: Financial development in South Africa and bank concentration in SADC

Dependent variable: Bank concentration					
Variable		**Model 1**	**Model 2**	**Model 3**	**Model 4**
Constant		22.225 (0.0006)***	2.6382 (0.6135)	10.965 (0.1011)	24.340 (0.0001)***
Bank concentration☼ (-1)		0.8343 (0.0000)***	0.8169 (0.0000)***	0.8742 (0.0000)***	0.8110 (0.0000)***
GGDPPC☼		0.0381 (0.6779)	0.0692 (0.4450)	0.0236 (0.7981)	0.0456 (0.6167)
Financial openness☼		-0.2141 (0.7275)	-0.2720 (0.6488)	-0.4167 (0.4987)	-0.1431 (0.8146)
Foreign banks proportion☼		-0.0245 (0.5500)	-0.0249 (0.5322)	-0.0402 (0.3273)	-0.0218 (0.5907)
Return on assets☼		-0.0710 (0.5983)	-0.0533 (0.6854)	-0.1195 (0.3773)	-0.0577 (0.6662)
Domestic credit in SA		-0.0422 (0.0441)**			
Liquid liability in SA			0.3103 (0.0002)***		
Private credit in SA				0.0265 (0.6620)	
Broad money in SA					-11.185 (0.0057)***
Diagnostic tests	*R-sqd*	*0.8614*	*0.8668*	*0.8592*	*0.8634*
	Adj. R-sqd	*0.8506*	*0.8565*	*0.8483*	*0.8528*
	F-stat	*80.468*	*84.269*	*79.011*	*81.847*
	Prob. (F)	*0.0000*	*0.0000*	*0.0000*	*0.0000*
	Observations	*266*	*266*	*266*	*266*

* SA-South Africa; t-statistic (probability); ***. **, * significant at 1%, 5% and 10% levels respectively

☼ These variables do not contain data for South Africa.

Source: Author's computations

The results in Table 7 show that domestic credit and broad money in South Africa have a negative effect on bank concentration in SADC (in that it reduces bank concentration in other SADC countries) and their coefficients are statistically significant. The results, however, show that liquid liabilities and private credit have a positive effect on bank concentration in other SADC countries, contrary to *a priori* expectations. It is difficult to ascertain an ultimate overall position on the effect of South Africa's financial development on bank concentration, as the measures of financial development have opposing effects. The negating effects are likely to produce insignificant net effects on concentration. No previous studies have attempted to establish such a relationship. Given limited weak financial spill-over effects in the region, the effect of South Africa's financial sector on concentration in the banking sector of other SADC countries is expected to be equally weak.

Conclusion

This study has performed a number of empirical tests around the issue of concentration in the financial sector within the region, with varying results. Using the HHI, the study established that the level of concentration in SADC's banking assets is generally high, as it is in South Africa. When South Africa is excluded, the level of concentration in the region is very low, indicating a fair distribution of banking assets across countries. Bank concentration has a negative effect across all measures of financial development. The study has also established that the level of income of a country has a positive effect on financial development. It further shows that bank concentration constrains development of the financial sector in all SADC countries regardless of income level, with the effect being more pronounced in low-income countries. The study has established the mixed and opposing effects of South Africa's financial development on bank concentration in SADC, with the negating effects likely to produce weak net effects on concentration.

The findings on bank concentration in SADC suggest that financial markets support the expansion and diversification of the banking sector, despite markets having relatively low levels of development compared to South Africa. The findings concur with the argument of Gwama (2014), that the concentration of financial development (within or across countries) brings inequality which retards financial development. The financial sectors of most SADC countries are bank based, and that sector is dominated by a few banks, reflecting high levels of concentration. The fact that the financial sectors of most SADC countries remain underdeveloped confirms the notion that in SADC, financial development can only be driven by reducing concentration. This assertion supports the anti-concentration theory.

In as much as the theory states that bank concentration can bring economies of scale that promote financial growth, strong and large institutions in SADC countries create banking systems with significant market power. Theoretical arguments by Demirgüç-Kunt and Levine (2005) are that banking systems with high market power have their own inefficiencies, including the high cost of financial services, high interest rates, and poor reach and access. In SADC, the economies of scale that theory argues would come from having a concentrated financial sector, particularly in the banking sector are not enough to support the development of the financial sector in SADC countries. In the majority, the financial sectors remain relatively underdeveloped, with high levels of financial exclusion despite the presence and dominance of a few large banks that should be providing the economies of scale to support financial development.

The diversification of financial systems is apparent in SADC. Microfinance institutions, wholesale funds to small and medium enterprises (SMEs), mobile banking and mobile money are forms of financial diversification that have brought new players and new institutions to the financial systems of most SADC countries. These have somewhat helped to increase the access and depth of the financial sectors of most SADC countries – a development that the dominant large banking institutions have failed to pursue effectively.

The study findings – that South Africa's financial development is not effective in reducing banking concentration in other SADC countries – suggest that South Africa's banking institutions that are expanding into other SADC countries are either part of the large and dominant few, or do not have an impact on bank concentration in these countries. Furthermore, although not empirically tested in this study, the findings could imply that financial development in other SADC countries may be enhanced through promoting the expansion of non-bank financial institutions to enhance the diversity of financial institutions in these countries.

Endnote

1. SADC members are Angola, Botswana, DR Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, the Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe.

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Annexure 1

Multicollinearity test results

The variables were tested for multicollinearity using a correlation matrix. Multicollinearity arises from the perfect linear relation among regressors, as this results in inflated standard errors and consequently inaccurate parameter estimations (see Table A1).

Table A1: Correlation matrix

	DC	LL	BCP	M2	GGDPPC	TO	FO	RINT	**BC**
DC	1.0000								
LL	0.6045	1.0000							
BCP	0.7292	0.7134	1.0000						
M2	0.5032	0.6695	0.5768	1.0000					
GGDPPC	-0.0948	0.0948	0.0062	0.0403	1.0000				
TO	-0.0979	0.3497	0.1055	0.1812	0.2073	1.0000			
FO	0.0838	0.3724	0.1644	0.2329	0.2121	0.1872	1.0000		
RINT	0.0327	0.0726	0.0705	-0.0403	-0.2334	-0.1325	-0.0507	1.0000	
BC	-0.0634	-0.0545	-0.1420	0.0480	-0.0189	0.1716	-0.2173	-0.2174	1.0000

Source: Author's computations

A pair-wise or zero-order correlation coefficient greater than 0.5 should be regarded as large, 0.5–0.3 as moderate, 0.3–0.1 as small, and anything smaller than 0.1 as insubstantial (Cohen 1988). Table A1 shows a high correlation between bank credit to private sector and domestic credit, as well as between domestic credit and liquid liabilities. To address the challenge of multicollinearity of the variables, variables with a high level of correlation would not be included in the same model for any estimation in this study.

Panel stationarity test

The increased use of panel data unit root tests among empirical researchers with access to a panel data set (see Maddala & Shaowen 1999) has prompted this study to test for unit root in all the studies. Table A2 shows the panel unit root test results

of the variables. Stationarity tests for this study were done using the PP-Fisher Chi-Square and the Levin, Lin and Chu methods. The Fisher PP test removes the autocorrelation using an adjustment to the standard errors and is stronger in respect of the size-adjusted power, whilst the Levin-Lin-Chu test is powerful if the time dimension T is large (Kunst 2011).

Table A2: Panel unit root tests at level

Variable	Levin, Lin and Chu	PP-Fisher Chi-Square
Bank credit to private sector (BCP) to GDP	0.78716	20.6174
First difference BCP to GDP	9.95172 ***	277.427***
Consumer price index (CPI)-inflation	4.32753***	95.3842***
Domestic credit (DC) to GDP	-1.71063***	47.2156**
Gross fixed capital formation	-2.9040***	66.6563***
Government expenditure to GDP	-4.01101***	69.2745***
Real GDP growth	-6.0888***	187.059***
Real GDP per capita growth	-6.1693***	189.686***
Liquid liabilities to GDP	-2.1033***	51.8866***
Real interest rate to GDP	-4.0880***	108.684***
Trade openness	-3.5849***	46.4778**
Broad money	-10.346***	78.737***
Financial openness	-2.3966***	48.199**
Bank concentration	-3.3915***	53.455**

t-statistic (probability); ***. **, * stationary at 1%, 5% and 10% levels respectively
Source: Author's computations

All variables, except for bank credit to private sector, are stationary in levels. Variables are stationary in levels mainly because they are in ratios or percentages – a transformation that makes them stationary. Furthermore, some variables are growth rates which technically are as good as differenced already. Bank credit to private sector is, however, stationary after first differencing. Bank concentration is stationary in levels under individual intercept and trend.