Spatial Externalities, Openness and Financial Development in SADC: Beyond the Multilateral Monetary Agreement

Alex Bara, Gift Mugano & Pierre Le Roux

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Alex Bara*, Gift Mugano† & Pierre Le Roux‡

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Abstract

This study empirically evaluates spatial externalities in financial development in the Southern African Development Community (SADC) in line with spatial proximity theory. The study specifically tests whether financially less developed economies in SADC benefit from their linkages with and proximity to South Africa, a financially developed economy. GMM and Dynamic Fixed Effect estimations established that financial development in the SADC is not immune to spatial externalities. Results indicate that monetary measures are more sensitive to geography than credit. Allowing for spatiality, credit from South Africa displays strong positive spatiality under Dynamic Fixed Effects but no effect under GMM, possibly responding to crowding-out, South Africa's global linkages and natural flow of credit towards optimal returns. Implicitly, the spatial variable has a strong complementary effect in the money market and a relatively inconsistent complementary effect in the credit market. Estimations that controlled for effects of monetary union in the model also confirm that financial development is affected by spatiality in the money market and is less responsive to spatial effects in credit. The current level of trade and financial openness in SADC is not enough to facilitate financial development in other subsectors of the financial sector, beyond money.

Keywords: Spatial Externalities, Spatiality, Financial Development, SADC

JEL Classification: R12, H13, R15, O16, G20

*(Corresponding Author). Email: alexabara15@gmail.com; alexabara@yahoo.com. PhD Candidate - Nelson Mandela Metropolitan University. 14-16 Nelson Mandela Avenue, Harare, Zimbabwe

†Dr. of Economics - Nelson Mandela Metropolitan University

‡Professor of Economics – Nelson Mandela Metropolitan University

1 INTRODUCTION

Economic variables tend to exhibit variation not only over time, but also across space. Space influences the way an economic system works and is a source of economic advantages or disadvantages such as high or low endowments of production factors and ease or difficulty of accessibility. The role of spatiality has recently gained significance in economic thinking both in terms of the geographical aspects of economic development, as well as the spatial dimension of economic activities (Zoltan 2015). Where space and time are involved, proximity matters. Proximity brings agglomeration to industries and enhances knowledge spillovers and transfers. In trade it promotes integration, enhances cross-border trade, reduces transport costs and reduces non-economic barriers, including language and culture. In development, it has a pulling effect. Spatial proximity also generates economies that reduce production and transaction costs (Capello 2011). But then, does proximity matter in services, more-so in finance and financial development? Two critical issues arise: Firstly, whether being close to a financially developed economy is advantageous for financial sector development. Secondly, whether financially less developed economies realise any externalities from their proximity to, and linkages with, a financially developed economy. Specifically, does this theoretical argument on spatial proximity subsist in SADC countries in terms of financial development?

In the SADC, there are countries that, despite being close to each other and highly interconnected, have significant differences in terms of their levels of financial development. South Africa has one of the most advanced financial markets in Africa, which compete on a global scale, but is surrounded by countries with relatively underdeveloped financial sectors South Africa has the largest level of domestic credit to private sector to GDP (147 per cent) This is followed by Mauritius 91.5 per cent; Namibia 48.5 per cent) and Botswana, 27.5 per cent (World Bank 2015). South Africa has a large sophisticated and well-developed financial sector with assets worth over US$500 billion. The banking sector accounts for US$320 billion of these assets and contributes about 10.5 per cent to South Africa's GDP (AfDB 2014). South Africa was ranked 7th out of 144 countries in terms of financial market development by the 2014/15 Global Competiveness Report (World Economic Forum 2014). Financial sector assets amount to 298 per cent of GDP, a ratio exceeding that of most emerging market (EM) economies, and banking assets are about 112 per cent of GDP, pension funds 110 per cent, insurance 64 per cent and unit trusts 42 per cent of GDP (IMF 2014). The liquidity and depth provided by NBFIs make these markets attractive to foreign investors, whose holdings of government bonds and equities, both at 34 per cent of the total, are among the highest in emerging economies (IMF 2014). South Africa was ranked 1^{st} out of 185 countries in the World Bank's report 'Doing Business 2013' with regard to obtaining credit (AfDB, 2014).

SADC countries outside South Africa are not financially developed and experience high levels of financial exclusion, for example, Namibia 38 per cent, Tanzania 56 per cent, Malawi 55 per cent and Zimbabwe 41 per cent (Allen,

Otchere and Senbet 2011). While South Africa is the obvious leader, other countries such as Mauritius, Botswana and Namibia have fairly developed financial markets in an African context, with the DRC, Madagascar and Malawi being at the other end of the spectrum (KPMG 2014).

Given the evident discrepancy between South Africa and the rest of the countries in the region in terms of financial development spatial theory suggests that proximity to South Africa should drive financial development in other SADC countries. The spatial proximity theory asserts that externalities increase with proximity (Capello 2009) and in finance, countries closer to a relatively more developed country benefit more from spillover effects than those further away. Mobolaji (2010) found evidence of spatiality in Sub-Saharan Africa (SSA) countries, where countries close to South Africa benefit more from financial development in South Africa than those that are far away. Financial systems naturally influence the allocation of resources across space and time (Levine 2005) and are sensitive to the geographical environment and not immune to spatial externality (Mobolaji, 2008). Given South Africa's financial and economic dominance, financial development of countries around South Africa is expected to be enhanced by spatial externalities.

This study empirically evaluates spatial externalities in financial development in SADC in line with the spatial proximity theory. The study specifically tests the nature of spatial externalities that derive from financial development in South Africa to their financial sectors as a result of their proximity to, and linkages with, South Africa. The study also evaluates spatial effects in SADC beyond the monetary agreements (union) in the region by controlling the effects of the Multilateral Monetary Agreement Furthermore the study also evaluates whether trade and financial openness matter in enhancing spatial externalities of financial development in SADC countries. The study uses the Spatial Durbin Model and the model is estimated using Generalised Methods of Moments and Dynamic Fixed Effects estimations.

2 LITERATURE REVIEW

Economists interested in economic geography have sought to develop and explicate spatial implications of economic activity (Clark 2001). Spatial proximity refers to the geographical distance between entities Spatial proximity initiates personal contact and fosters knowledge transmission and collective learning processes, often in combination with cultural, vocational and organisational proximity (Grote, Harrschar-Ehrnborg and Lo 2000). Diffusion of ideas depends on physical proximity, technological specialisation, the stage of economic development, labour mobility and other factors (Benos, Karagiannis and Karkalakos 2015).

There are overlaps between the disciplines of economic geography and finance (Clark 2001). Financial geography shows how location remains important in the conduct of financial transactions and markets. It also shows how financial decision-making and the allocation of finance remain concentrated in the major

money centres (Zoltán 2013). The implication is that regions and locations, lacking such centres and that are remote from them are at a disadvantage in accessing finance (Zoltán 2013). Location decisions for financial markets have a deliberate geographical rationale (O'Brien and Keith 2009).

A salient feature of a nation's financial development is its ability to generate positive spatial externalities to neighbouring countries (Mobolaji 2010). The financial sector has a contagion effect beyond a country to other economies (Baltagi *et al.* 2007). Inefficiencies in the financial sector (including imperfect competition, high transaction costs, asymmetric information between investors and savers), pervasive risk and uncertainty justify spatial consideration in the financial markets (Klagge and Martin 2005). Geographical closeness to a more financially developed country may generate spatial externality to the neighbours (Mobolaji 2010). Externalities are in the form of technology transfer, information sharing, efficiency, reduction of transaction cost, risk sharing, and enhancement of liquidity (Mobolaji 2010). Proximity, however, can generate negative spatial externalities to neighbouring countries in particular crowding-out of the domestic financial sector of the recipient country due to fierce competition (Mobolaji 2010).

There are, however, arguments which criticise the importance of geography in finance. Zoltán (2013) pointed out that technology and innovation are reducing the role of spatiality in finance. The central hypothesis of 'The End of Geography' devised by O'Brien in 1990, states that geographical location no longer matters in finance or matters much less than hitherto (O'Brien and Keith 2009). Due to spatially unbounded money (financial) flows, globalisation and new ICTs are increasingly rendering geography and location irrelevant in financial markets. With electronic transactions, there is no need for physical proximity in long-distance transactions (Zoltán 2013). O'Brien and Keith (2009) added that despite the fact that many location decisions have a deliberate geographical rationale, money, being fungible, will continue to avoid the confines of geography.

Studies on spatial analysis have focused more on beta convergence of economic growth across countries or regions/states within a country with no consideration of the financial sector. Fernandez (2009) noted that although spatial phenomena has been extensively studied in various research fields, the study of spatial linkages has essentially been overlooked in other sub-fields of economics and in the field of finance as a whole. The importance of spatial effects in convergence analysis has been ignored in financial development-economic growth literature (Yildirim, Öcal and Erdogan 2006). In the literature on financial development, emphasis is placed on the correlation between financial variables and the degree of development of the financial system. The issue of regional or geographical aspects of the financial system development have virtually been neglected (Crocco, Santos and Amaral 2010).

Globally, the impact of spatiality and spillover in the financial area has mostly been analysed in stock and financial markets. Spillover effects are highly pronounced during crises such as the recent global financial crisis. Spatial proximity and inter-connectedness of markets were the central transmission chan-

nels of the global financial crisis and financial linkages that contributed to the spread of these financial stresses across borders (IMF, 2013). Dell'Erba, Baldacci and Poghosyan (2013) used the Spatial Autoregressive (SAR) model to explore spillovers in the sovereign bond market for 24 emerging economies during the period 1995 to 2010. The study found strong evidence of spillovers from both sovereign spreads and macroeconomic fundamentals in neighbouring emerging economies

Mobolaji (2008) analysed the impact of spatial externality on financial development in Sub-Saharan Africa for the period 1970 to 2005 in a dynamic panel data framework. The study suggested that the financial system is geographically sensitive and not immune to spatial externalities. Benos, Karagiannis and Karkalakos (2015) investigated the relationship between proximity and economic performance in European regions. The research found that proximity has an effect on the capital and labour markets driven by dynamic interactions within and across economies. Crocco, Santos and Amaral (2010), using a GMM estimator for a spatial panel model with an endogenous spatial lag and spatial moving average errors, found negative spatial association between the Brazilian municipalities' financial system. Brugal (2012) used the Diebold and Yilmaz measure of financial market spillovers to analyse the return and volatility spillovers among Latin America's Stock markets namely Argentina, Brazil, Chile Mexico and the United States. The results indicated higher connectedness that produced volatility spillovers with jumps in fragile periods and return spillovers evolving gradually.

3 METHODOLOGY AND DATA

There are a number of models that can be used to analyse spatial effects in financial development, including the Spatial Autoregressive (SAR) Model, the Spatial Error Model (SEM), the Spatial Panel Model - Moving Average (MA) Error Process and the Spatial Durbin Model (SDM). The Spatial Durbin Model (SDM) has more strengths than the other three models mainly due to its ability capture externalities and spillovers arising from different sources (Beer and Riedl, 2010). The SDM has a spatial lag on the independent variables which enable testing of the spatiality effects of any independent variables (mostly as a result of externalities) on the dependent variable. LeSage and Pace (2009), pointed out that a SDM model is created by including in a regression a spatial lag of independent variables in addition to the spatial lag of the dependent variable. The SDM model is suitable for the analysis in this study due to its ability to consider externalities. The transmission mechanism through which countries in the SADC benefit from being close to South Africa a financially developed country is mainly through externalities. In addition, the model allows for the use of restrictions to enable the derivation of panel estimation regressions which in the context of this study, addresses the need to isolate spatial effects from South Africa alone without considering crosscountry spatial effects among other countries.

3.1 The Spatial Durbin Model (SDM)

The Spatial Durbin Model is a modification of a model originally developed by Durbin in 1960 in the context of time series analysis (Anselin, 1988). In its spatial version, it is the unrestricted reduced form of a model with cross-sectional dependence in the errors and appears as the nesting model in a more general approach of model selection. Beer and Riedl (2010) noted that the cross-sectional SDM can be written in the following way:

$$y = pwy + X\beta + wX\gamma + \varepsilon \quad \text{for} \quad \varepsilon \tilde{} N(0,1) \tag{1}$$

where w denote an NxN spatial weight matrix and y and ε ectors of dimension N including the dependent variable and the error term, respectively; X is an Nxk matrix of independent variables. The SDM can be regarded as special cases of other spatial models through imposing certain restrictions. If we restrict $\gamma = 0$ the remaining model will be a spatial autoregressive model (SAR) and if we restrict $y = -p\beta$ the SDM reduces to the frequently applied spatial error model. To extend the model to the panel case we order the dependent variable as $y = (y_{11} \dots y_{1T,} \dots y_{N1} \dots y_{NT})'$, where the lower index denotes the cross-sectional units $i = 1, \dots, N$ and the faster index refers to the time dimension $t = 1, \dots, T$. The model can then be written as follows:

$$\begin{gathered} y = pWy + X\beta + WX\gamma + Z\mu_1 + WZ\mu_2 + \varepsilon \\ \text{for } \varepsilon \sim N(0, \sigma^2\ \Omega \ \text{ and } \Omega\ = \Sigma_N \otimes w_T \end{gathered} \tag{2}$$

This study transforms the SDM model by adding a spatial component on an explanatory variable that is not the dependent variable, while retaining the dependent variable as one of the explanatory variables. The spatiality component of the lagged dependent variable is set at one. This transformation is based on the assumption that the only spatial spillovers under consideration are from South Africa. Financial development spillovers from and among other SADC countries are not considered. As such this study isolates the lagged variable of financial development in South Africa (FDSA_{t-1}) and interact it with spatial dependence parameter ρ. Equation 2 could be transformed to:

$$FD_{i,t} = \beta_1 WFD_{i,t-1} + \beta_2 X_0 + \beta_2 W_s X_s + Z\mu_1 + WZ\mu_2 + \varepsilon \tag{3}$$

where FD is an indicator for financial development in country i in period t, W is the spatial weight, X_0 are other independent variables, X_s is the spatial interacted independent variable.

The underlying assumption in this model is that spatial effects of financial development are coming from South Africa to other SADC country. Financial development of among other SADC countries outside South Africa is assumed to have no spatial effect as the countries' financial sectors are comparatively small, less developed and less interconnected. As such, $W = 1\ for\ w_s \neq w$,

to differentiate it from the spatiality effect of the independent variable. This reduces the spatial factor on the lagged dependent variable to one, transforming the variable to panel autoregressive variable with no spatial term. Following Beer and Riedl (2010), an estimator is proposed that eliminates the fixed effects Z and WZ in the first step, in order to eliminate multi-collinearity problems when estimating equation 3. Further, set $X_s = FDSA_{t-1}$, the lagged variable of financial development in South Africa; $W_s = (1-\rho)$ and X_0 to be the other independent variable, currently set as GGPPC (and later it includes financial and trade openness and real interest rate). The transformed SDM model for this study becomes:

$$FD_{it} = \beta_1(1-\rho_{it})FD_{it-1} + \beta_2 GGDPPC_{it} + \beta_3(1-\rho_{SA})i * FDSA_{t-1} + \varepsilon_{it} \quad (4)$$

where FD is an indicator for financial development in country i in period t; GGDPPC is growth in GDP per capita which acts as a control variable for the demand of financial services and other economic factors; $(\mathbf{1} - \rho_{it})$ is the spatial factor for SADC countries (which equal 1 when spatial effects between other countries in SADC is ignored) ρ_{SA} is the distance of country i from South Africa (SA) as a ratio of the distance of the furthest SADC country from South Africa, thus, the degree of closeness to South Africa. Hence, $(\mathbf{1} - \rho_{SA})_i$ becomes the weight/degree of (financial) interconnectedness of country i with SA measured by the geographical distances. It is assumed that the financial interconnectedness between countries other than South Africa in the region is weak and immaterial, and is therefore assumed constant at one, that is $(\mathbf{1} - \rho_{it})$. In addition, feedback spatial effects from other countries to South Africa are not considered.

$FDSA_{t-1} = [dc_{SAt-1}; ll_{SAt-1}; bcp_{SA_{t-1}}; and\ bm_{SAt-1}\}$ is the lagged level of financial development variables (*dc*-domestic credit, *ll*-liquid liabilities, *bcp*-private credit and *bm*-broad money respectively) in South Africa in year $t-1$,included to allow for the partial adjustment of financial development to its long run equilibrium value.

This study also follow Chin and Ito (2006); Baltagi *et al* (2007) and Mobolaji (2008) to add trade and financial openness variables to equation (5) in anticipation that openness enhances better trade, financial transaction and development, and has a greater impact on the spatial variable. Equation (4) is then further extended to:

$$\begin{aligned} FD_{it} &= \beta_1(1-\rho_{it})FD_{it-1} + \beta_2 GGDPPC_{it} + \beta_3 TO_{i,t} + \beta_4 FO_{it} \quad (5) \\ &+\beta_5 RINT_{it} + \beta_6(1-\rho_{SA})_i * FDSA_{t-1} + \beta_7 MMA_i \varphi_{it} * FDSA_{t-1} + \varepsilon_{it} \end{aligned}$$

The inclusion of trade openness is on the basis that countries with trade arrangements with South Africa are more open to trading and this enhances the financial flow. The finance openness (FO) variable is proxied by the Chin-Ito-Index in line with Chin and Ito (2006). In addition, a dummy variable is

introduced to control or capture the effect of monetary union under the Multilateral Monetary Agreement. The variable is represented by a dummy MMA_i which takes the value 1 if the country is in a monetary union with SA or zero otherwise. The dummy is interacted with φ_{it} (the proportion of country i's central bank assets as a ratio of the Reserve Bank of SA's assets in period t) to capture the proportion of financial development which is translated to that country from SA through the monetary agreement. The monetary union is expected to enhance better financial transaction and development, and to impact more on the spatial variable.

3.2 Sources of data, variables description

The study uses panel data of all the 15 SADC countries for the period 1985 to 2014, sourced from the World Development Indicators (World Bank, 2015). Data were analysed using the E-Views 8 econometric software The variables used in spatiality and financial development empirical testing and the expected signs on explanatory variables are presented in Table 1. All the variables, except those indicated by SA, are for SADC countries other than South Africa and do not contain data for South Africa.

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 capture the 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 often also invite interference by government in the markets as well, which affects financial development. Credit to the private sector represents an accurate indicator (proxy) as it is a measure of the quantity and quality of investment (Beck *et al.,* 2000). Credit to the private sector is widely used as a proxy for measuring financial development in literature. Liquid liabilities consist of currency held outside the bank system plus interest-bearing total deposit liabilities of banks and other financial institutions. Liquid Liabilities reflects the overall size of the financial intermediary sector in a country and are used as a measure of "financial depth" (King and Levine, 1993a).

Economic growth is measured by real GDP per capita, following King and Levine, (1993) as it goes beyond indicating a country's economic size through income stock but also captures the distribution this income, enabling fair cross-country comparisons.

A priori expectations are that financial development in South Africa, as measured by the four variables, is expected to have a positive impact on financial development in SADC countries and this impact should be affected by spatiality. All control variables, namely growth in GDP per capita, Trade Openness, Financial Openness and Real Interest Rates are expected to have positive coefficients, implying a positive impact on financial development in SADC.

4 EMPIRICAL RESULTS

4.1 Generalised methods of moments results

Table 2 presents GMM estimation results for the effects of financial development in South Africa on the financial development of other SADC countries, without spatial effect. In other words, the GMM estimations do not include spatial variables. The rationale is to assess the general effect of South Africa's financial development to regional countries regardless of proximity. The results are for each of the four measures of financial development in SADC.

The results show that South Africa's liquid liabilities, and broad money have positive and statistically significant effects, at 5% and 10% respectively, on their corresponding variables for other SADC countries. Implicitly, the results are showing that an increase in liquid liabilities and broad money in South Africa results in growth of liquid liabilities and broad money of other SADC countries. South Africa's domestic and private credits are not statistically significant to explain their corresponding values in other SADC countries, although the signs of their coefficients are negative and positive, respectively.

Overall, the results indicate that an increase in financial development (money market) in South Africa support development of financial sectors of other SADC countries. The results are consistent with Canales-Kriljenko, Gwenhamo and Thomas (2013), who found substantial spillovers from South Africa into the other members of the SADC Customs Union reflecting sizeable real and financial interlinkages. Although the credit variables were statistically insignificant interpretation of their effect based on the sign of the coefficients indicate mixed effects. Fundamentally, without spatial effects, the results suggest that from South Africa, money is stronger than credit in driving financial development in SADC.

The coefficients of lagged dependent variables across all the measures of financial development are all high and significant. The results indicate evidence of considerable persistence in the variables and a strong dependence on past years' value. Trade openness is negatively related to financial development, a result that is contrary to expectation. Financial openness is positive, supporting financial development in SADC. Economic growth, as measured by Growth in GDP per capita, is consistently positive, related to all the proxies for financial development, but is significant in credit in line with Allen and Ndikumana (1998). The results suggest that in SADC financial development, as measured by credit, is largely demand following, a result consistent with Aziakpono (2004). Real interest rate supports financial development in SADC and its effects are significant in domestic credit and liquid liabilities. Financial openness strongly supports broad money in SADC and has an insignificant effect across other variables.

The study, however, seeks to establish whether spatiality matters in financial development in SADC. Table 3 presents the results of GMM estimation on the impact that financial development in South Africa has on other SADC countries when spatial variables are included; taking into account effects of spatial

externalities or distance from South Africa.

4.1.1 Money Variables (Liquid Liabilities and Broad Money)

Using Liquid Liabilities and Broad Money as indicators of financial development, the coefficients of the spatial variables are statistically significant at 10 per cent and positive. The results suggest the presence of positive spatial externality in the SADC countries in line with *a priori* expectations. The spatial variable $(\mathbf{1}-\rho_{SA})_i$ in the estimated model is the weight/degree of (financial) interconnectedness of country i with SA measured by the geographical distances. As such, based on the given results, it implies that the closer a country is to South Africa (SA), the more its liquid liabilities and broad money are interconnected and hence benefit from an increase in liquid liabilities and broad money in South Africa. Indirectly, the spatial variable has a complementary effect in the money market.

The results are consistent with Benos, Karagiannis and Karkalakos (2015) who found that proximity matters in capital markets in European regions and with Mobolaji (2008, 2010) for SSA countries. The results are also in support of Baltagi *et al.* (2007) that the financial sector has a contagion effect beyond a country to other economies. Furthermore, the results are also in line with findings of the IMF (2012) that financial development in the advanced economy can spill over to other countries through several channels, which include trade, remittances and financial sector interconnections.

Possible explanations for this result is that liquid liabilities and broad money reflects monetary attributes; as such, there are more direct spillover effects to countries that are closer to South Africa. There exists high demand for South African money market instruments in neighbouring countries driven by financial flows, cross-border trading and remittances from South Africa. The use of South Africa's currency in four SADC countries, Lesotho, Namibia, Swaziland and Zimbabwe, coupled with the Monetary Area Agreement with Botswana could be influencing the results. Some of these countries have a common economic and monetary union that facilitates spatial externalities of monetary variables (Mobolaji, 2010). In addition, a number of South Africa's financial institutions have more branches in the neighbouring than in further away countries. Such institutions have direct access to money in South Africa through their parent institutions in the form of offshore balances and banking services. Furthermore, such institutions help in the circulation of the South African Rand not only in countries where it is regarded as legal tender, but where there is significant cross-border trade with South Africa. Mobolaji (2010) added that in many of these countries, there are no exchange or credit restrictions such that firms are free to borrow from South African banks. Given that these countries are closer to South Africa than other SADC countries, their monetary linkages with South Africa might be influencing the results. Overall, the outcome is, however, in support of the theory on spatial externalities in finance.

The lagged dependent variables remain high and statistically significant at 1 per cent level, indicating evidence of a strong dependence on previous period

values. Financial openness is positive, and significant in supporting financial development in SADC only in broad money, consistent with results of estimations without spatial effects. Trade openness is statistically insignificant although the dominant sign of the coefficients is negative, presumably due to skewed trade balance in SADC in favour of South Africa. Economic growth relates positively to financial development and is significant in supporting liquid liabilities rather than credit variables. The GMM results show that in SADC only does the real interest rate significantly support domestic credit.

4.1.2 Credit (Domestic and Private)

With credit (Domestic Credit and Bank Credit to Private Sector in South Africa) as a measure of financial development, the spatial variable has a statistically insignificant effect on credit in SADC. Since the variable is insignificant, analysis would only be limited to the sign of the coefficient. The sign of the coefficients of spatial variables imply that credit in South Africa has a negative spatial effect on credit in other SADC countries. The negative sign is consistent with Crocco, Santos and Amaral (2010) who found negative spatial association between the Brazilian municipalities' financial system and the findings Mobolaji (2008, 2010) who found negative spatial effects of credit in SSA. Mobolaji (2008) pointed out that negative spatial externalities on credit in South Africa could be because access to credit facilities by customers is improved, and the cost of credit to investor is reduced through competition among banks.

There is, however, need for caution in the interpretation of the negative sign on credit variables. The negative sign indicates that more credit from South Africa goes to countries far away than to countries close by, and as such, is inversely related to a country's distance from South Africa. The negative sign could also reflect the crowding-out effects of credit from South Africa on credit in the SADC countries. In other words, an increase in credit in South Africa has the potential to replace credit of neighbouring countries driven by interlinkages and high presence of South African firms and financial institutions in neighbouring countries. South Africa has a developed financial market that offers competitive credit when compared to its neighbours. Neighbouring countries, with the exception of Namibia, Botswana, and to some extent Zimbabwe, have relatively small and underdeveloped financial sectors that do not offer better terms for their credit; domestic markets therefore have high affinity for South African credit. South African credit has a strong substituting effect on credit in neighbouring SADC countries.

Furthermore, the negative sign could be indicating elements of natural behaviour of credit. Most South African and other companies operating in SADC countries are able to secure credit in South Africa to support operations in these countries. Credit normally flows to where there are high returns and favourable conditions in line with the theoretical argument by Levine (2005) that financial systems optimally allocate resources across space and time. The negative sign could be capturing the fact that private credit from South Africa is flowing to strong markets and economies in faraway countries such as Mauritius in the

form of Foreign Direct Investment. Over the period 2001 to 2010, Mauritius was the highest recipient of investments from South Africa, on average 44 per cent, followed by Tanzania at 12 per cent and Mozambique 7 % per cent (Nkuna 2014). Further, in 2010, countries around South Africa received a low amount of loans from South Africa as a proportion to their GDP, with Lesotho and Swaziland receiving below 1 per cent, Mozambique 1.6 per cent, and Zimbabwe 1.9 per cent, whilst Mauritius, a country relatively far away received 3.2 per cent.

This notwithstanding, since the coefficients are not significant, the negative sign alone would not suffice for the study to conclude on the relationship. This study therefore, ran a dynamic panel estimation as a robustness check of the results.

The lagged dependent variable is high and significant, indicating evidence of a strong dependence on previous period values in line with Chinn and Ito (2006) and Baltagi *et al.* (2007). Only growth in GDP per capita has a consistent positive relationship with all the proxies for financial development, whilst real interest supports financial development in the SADC countries under domestic credit. The other control variables are not strong enough to affect the dependent variables.

4.2 Dynamic Fixed Effect results

This study ran Dynamic Fixed Effect estimations to check for robustness of GMM estimation results. Dynamic panel estimations can be carried out either under fixed or random effects. The study carried out Hausman tests to select a suitable approach and Table 4 below shows the Hausman test results. The results suggest use of Fixed Effects estimation for all the measures of financial development.

In line with the suggestions of the Hausman tests, the study only presents results of the Fixed Effects. Robustness checks were performed only for models with spatial effects. Table 5 presents results of the Dynamic Fixed Effects estimation for the model with spatial effects.

Dynamic Fixed Effects estimations produce results at variance with that of GMM on the impact of spatiality on credit. The spatial variables for credit are now positive and statistically significant at 5 per cent for domestic credit and 1 per cent for private credit. This indicates that with dynamic fixed effects, credit from South Africa is highly sensitive to proximity. Implicitly, the distance weighted interconnectedness of SADC countries with South Africa supports access to credit by countries that are closer to South Africa. The results are showing that for South Africa's credit to SADC countries, more of it is going to neighbouring countries[1].

[1] It is critical to point out that the credit referred to is not the entire credit from South Africa, but only that goes to SADC countries. Given the dominance of South Africa in Africa in terms of financial development, more credit could be going outside SADC than to SADC countries.

The results are possibly indicating combined effects of the amount of credit that countries around South Africa are receiving regardless of the size of the individual countries' financial sectors. Since countries around South Africa have relatively smaller financial sectors, aggregated effects of credit received from South Africa through branches of financial institutions, could be large enough for the overall credit from South Africa to respond to distance. Furthermore, South African private and public developmental institutions, such as the Development Bank of South Africa, access credit in the South African market and extend this to other countries through financing developmental projects. The AFRODAD (2014) indicated that the Development Bank of South Africa (DBSA) has been a major source of loans to Zambia, Tanzania, Namibia, Lesotho, Mozambique, Madagascar, the DRC and Malawi.

In addition, the result could also be indicating the relation of the amount of credit received by countries relative to the sizes of their financial sectors. Most SADC countries, with underdeveloped financial sectors, are closer to South Africa (Swaziland, Lesotho, Mozambique and Zambia). South African banks have a significant share of assets in these countries; Swaziland 65 per cent (representing 29 per cent of GDP) and Lesotho 97 per cent (representing 47 per cent of GDP) and sizable presence in Botswana, Seychelles, Zambia and Zimbabwe (IMF 2014). As such, the credit they receive from South Africa could be significant, when compared to the size of financial sectors; hence the positive effects.

On money market variables, the spatial externalities variable has a positive significant effect that is positive under broad money, consistent with GMM estimations. The spatial variable, however, has a negative significant effect under liquid liabilities. It could be difficult to explain the new effect on liquid liabilities. Suggestions could be that the spatial variable is picking the relative sizes of liquid liabilities across countries, reflecting size of intermediation, which for neighbouring countries is low.

Openness Variables

Financial openness has a positive support of broad money under GMM and insignificant support under dynamic fixed effects. Trade openness does not support financial development in the SADC countries. This study did not test for the Rajan-Zingales hypothesis on simultaneous openness of both trade and financial sector. However, findings on openness suggest that financial openness offers greater scope for advancing financial development through the money market than trade openness in the SADC region, contrary to findings by Mobolaji (2010). The SADC region was established mainly to promote trade among the countries and until 1994 to reduce dependence of South Africa. As such, trade in SADC has been open and has not driven financial development given the unfavourable trade balance across countries. Most countries in SADC are net importers from South Africa that creates skewed demand for financial services towards South Africa. On the other hand, opening of the capital account seems to support movement of monetary attributes across countries than other instruments of financial development such as credit. In SADC, financial openness is more beneficial to the redistribution of South Africa's broad money in

neighbouring SADC countries than trade openness.

This study conducted further analyses on spatiality in financial development by controlling for the monetary union (Multilateral Monetary Agreement - MMA) in the SADC. The rationale is that countries in the MMA are very close to South Africa and the expectation is that spatial externalities would be at their maximum. As such, geographical proximity of countries in the monetary union could be influencing the behaviour of spatial variables, hence the need to control them. The expectation is that if the monetary union effects were controlled, variables would give a robust indication of spatial effect beyond the influence of the monetary union. The analysis also a robustness check for consistency of the GMM results after factoring out the current monetary agreement arrangement in SADC.

4.3 GMM Estimation with Spatial Effect and Monetary Union (Agreement) Variable

Table 6 below presents the results of the GMM estimation of the model with Spatial Effects and Multilateral Monetary Agreement effects.

When the effects of the monetary union are controlled, the spatial externalities have a positive (significant) effect on liquid liabilities consistent with GMM estimations. The spatial variable for Broad Money retains a positive, although statistically insignificant, effect perhaps indicating that the monetary union has influence on the significance of the coefficient. The spatial variables for credit, although statistically insignificant, remain consistently negative. Other control variables remain with the same effect as under GMM estimation with spatial effects. Financial and Trade Openness are now supporting Broad Money after netting out the effects of the monetary union. This could be due to increased movement and usage of the Rand beyond the monetary union countries, driven by cross- border trade, and remittances.

The results also show that South Africa's financial development that is absorbed in other MMA countries has no effect on financial development in SADC countries, as all the coefficients are not significant. The results also suggest an absence of second level spill-over effects from MMA countries into other SADC countries, and low levels of financial interconnectedness between other MMA countries and SADC countries. Overall, the implication of the result is that financial arrangements (Monetary agreements) in SADC have some, although limited, influence on the spatial externalities of money and no influence on credit in the region. The monetary union is not strong enough to control spatial externalities of South Africa's financial development in SADC.

5 CONCLUSIONS AND RECOMMENDATIONS

This study analysed the effect of spatial externality on financial development in SADC countries using Generalised Methods of Moments and Dynamic Fixed Effects estimations. Results of the study suggest that there is a spatial effect

on financial development in the region and the significant spatial externality among the countries is largely positive. Financial development in South Africa is responsive to spatiality although the responsiveness varies with the specific aspect of financial development. Results indicate that monetary measures (Liquid Liabilities and Broad Money) are highly sensitive to geography (proximity) and elicit positive spatial economies of scale. The results also indicate that allowing for spatiality under GMM estimations, credit from South Africa seems not to respond to spatiality effects. However, credit exerts positive spatial effects on credit in SADC when Dynamic Fixed Effects estimation is used. The results suggest presence of spatial benefits for financial development in SADC and the benefits are highly visible in the money market. The spatial variable has a strong complementary effect in the money market and a relatively inconsistent complementary effect in the credit market. Proximity to South Africa brings spatial externalities which support growth in the financial development in SADC mostly thorough the money market. Indirectly, it can be concluded that South Africa's monetary policy has a regional effect.

Spatial proximity theory asserts that externalities increase with proximity (Capello 2009) and in finance, countries closer to a relatively more developed country benefit more from spillover effects than those further away. In SADC the spatial theory is seemingly more applicable in money and money markets, than in credit markets The money market in SADC, in particular broad money, has distinct spatial tendencies. On the credit market, although the positive spatial effects are evident, they are made inconsistent by elements of crowding-out, natural flow of credit towards optimal returns in stable markets and South Africa's global linkages Furthermore, credit from South Africa has limited sensitivity to proximity in support of the theoretical position by Levine (2005) that financial systems naturally influence the optimal allocation of resources across space and time.

Overall, South Africa's financial development is able to generate positive spatial externalities to neighbouring countries, a salient feature that a financially developed country should have (Mobolaji, 2010). The indication is that South Africa's financial sector, particularly the money market, has a contagion effect in the SADC region in support of a theoretical argument that financial sectors have a contagion effect beyond a country to other economies (Baltagi *et al.* 2007). The imperfect competition, high transaction costs, asymmetric information between investors and savers in other SADC countries are increasing the spatial effect of financial development around a relatively efficient South Africa. Such inefficiencies in the financial sector, pervasive risk and uncertainty justify spatial consideration in the financial markets (Klagge and Martin, 2005).

Estimations that controlled monetary union indicated that beyond the monetary area, South Africa's broad money continues to be affected by spatiality and credit is not responsive to spatial effects. Countries in the monetary union are too small to induce spatial effects on credit. The money market in South Africa is affected by spatial externalities even beyond the monetary area, indicative of 'centripetal' forces of money and money markets in South Africa. Findings on openness indicate that the current level of trade and financial openness is not

sufficient to facilitate financial development in SADC beyond the money market. The findings suggest that financial openness offers greater scope for advancing financial development through the money market than trade openness in the SADC region

Overall, the findings indicate that there is more scope and potential for SADC countries to utilise financial development in South Africa to enhance development of their financial sectors through the money and credit markets. Countries close to South Africa need to have in place mechanisms of linking their monetary sectors to that of South Africa to benefit from positive spillovers. Countries also have to deal with any negative spatial externalities that might arise in South Africa's markets. SADC countries further need to extensively develop their financial sectors in order to counter the elements of crowding-out of domestic credit by credit from South Africa. Inevitably, the heterogeneity among SADC countries and the varying levels of financial development dictates that the region should promote financial integration in order to enhance development of underdeveloped financial systems through spatial spillover gains.

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Table 1: Variables description

Variable Category	Variable	Description	Definition
Dependent Variables	DC	Domestic Credit	Total credit by the financial sector to GDP
	LL	Liquid Liabilities	M3 as a proportion of the country's GDP
	BCP	Bank Credit to Private Sector (Private Credit)	Total credit by banks to private sector
	M2	Broad Money	Broad Money to GDP
Control Variables	GGDPPC	Growth in Real Gross Domestic Product per capita (GDPPC)	Growth in real Gross Domestic Product per capita
	RINT	Real Interest Rate	Real interest rate
	TO	Trade Openness	(Exports+ Imports)/GDP
	FO	Financial Openness	Chin-Ito-Index*
South Africa Financial Development Variables	DCsa	Domestic Credit in South Africa	South Africa's total credit by the financial sector to GDP
	LLsa	Liquid Liabilities in South Africa	South Africa's M3 to GDP
	BCPsa	Bank Credit to Private Sector in South Africa	South Africa's Total credit by banks to private sector to GDP
	M2sa	Broad Money in South Africa	South Africa's Broad Money to GDP
Other Variables	SP	Spatial Variable	
	MMA	Multilateral Monetary Agreement	Dummy for countries in Multilateral Monetary Agreement
	RMMA	Revenue proportion from the MMA	Revenue proportion from the MMA

* The Chinn-Ito index (KAOPEN) is an index measuring a country's degree of capital account openness. The index was initially introduced in Chinn and Ito (2006). KAOPEN is based on the binary dummy variables that codify the tabulation of restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER) (Chinn and Ito 2008).

Table 2: GMM Estimation of the Impact of Financial Development in SA on SADC Countries - without Spatial Effects

		Dependent Variable			
		Domestic Credit	**Liquid Liability**	**Private Credit**	**Broad Money**
Lagged Dependent Variable		0.9532 (0.0000)***	0.9871 (0.0159)**	0.9600 (0.0000)***	0.8428 (0.0000)***
GGDPPC		0.8366 (0.0265)**	0.2429 (0.1300)	0.7897 (0.0002)***	0.0031 (0.2857)
Trade Openness		-0.0084 (0.6186)	-0.0107 (0.0075)***	-0.0118 (0.2499)	0.0003 (0.0911)*
Financial Openness		0.2364 (0.6601)	0.2486 (0.2290)	-0.0900 (0.7697)	0.0115 (0.0133)**
Real Interest Rates		0.1127 (0.0027)***	0.0077 (0.0122)**	0.0152 (0.4266)	0.0002 (0.3799)
Domestic Credit in SA(-1)		-0.0035 (0.7859)			
Liquid Liability in SA(-1)			0.0313 (0.0148)**		
Bank Credit to Private Sector in SA(-1)				0.0122 (0.4734)	
Broad Money in SA(-1)					0.0439 (0.0732)*
Diagnostics tests	*R-sqd*	*0.8712*	*0.9450*	*0.8447*	*0.8397*
	AdjR-sqd	*0.8695*	*0.9442*	*0.8427*	*0.8375*
	D-W stat	*2.0820*	*2.2783*	*1.9296*	*2.0240*
	J-stat	*1.7841*	*2.9277*	*0.0145*	*1.0446*
	Prob(J)	*0.1817*	*0.0871*	*0.9041*	*0.3068*

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

Table 3: GMM Estimation of the Impact of Financial Development in SA on SADC Countries -with Spatial Effects

		Dependent Variable			
		Domestic Credit	**Liquid Liability**	**Private Credit**	**Broad Money**
Lagged Dependent Variable		0.9595 (0.0000)***	0.9950 (0.0000)***	1.0156 (0.0000)***	0.8644 (0.0000)***
GGDPPC		0.9910 (0.0114)**	0.2702 (0.0656)*	0.8415 (0.0002)***	0.0024 (0.4474)
Trade Openness		-0.0077 (0.6227)	-0.0143 (0.1373)	-0.0110 (0.2040)	0.0002 (0.2565)
Financial Openness		0.0204 (0.9715)	0.3537 (0.1837)	-0.4175 (0.2227)	0.0132 (0.0109)**
Real Interest Rates		0.1221 (0.0014)***	0.0086 (0.5343)	0.0152 (0.4379)	0.0002 (0.5602)
SP*Domestic Credit in SA(-1)		-0.0145 (0.3323)			
SP*Liquid Liability in SA(-1)			0.0576 (0.0597)*		
SP*Bank Credit to Private Sector in SA(-1)				-0.0184 (0.3484)	
SP*Broad Money in SA(-1)					0.0810 (0.0828)*
Diagnostics tests	*R-sqd*	*0.8656*	*0.9418*	*0.8373*	*0.8336*
	AdjR-sqd	*0.8637*	*0.9410*	*0.8351*	*0.8313*
	D-W stat	*2.0704*	*2.1993*	*1.9893*	*1.9718*
	J-stat	*0.8893*	*0.7306*	*0.9235*	*1.0887*
	Prob(J)	*0.3457*	*0.3927*	*0.3366*	*0.2968*

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

Table 4: Hausman Test - Financial Development with Spatial Effect

Dependent Variable	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.	Decision
Domestic Credit	39.902048	6	0.0000	Fixed Effect
Liquid Liabilities	46.280334	6	0.0000	Fixed Effect
Bank Credit to Private Sector	57.169714	6	0.0000	Fixed Effect
Broad Money	71.849444	6	0.0000	Fixed Effect

Table 5: Dynamic Fixed Effect - with Spatial Effects

Variable		Domestic Credit	Liquid Liability	Private Credit	Broad Money
Constant		5.1004 (0.0999)*	11.274 (0.0000)***	-1.1240 (0.5923)	0.0707 (0.03919)**
Financial Development in SADC (-1)		0.7861 (0.0000)***	0.8472 (0.0000)***	0.7658 (0.0000)***	0.6294 (0.0000)***
GGDPPC		-0.2167 (0.0806)*	-0.1733 (0.0005)***	-0.1384 (0.0213)**	-0.0047 (0.0000)***
Trade Openness		-0.0290 (0.3072)	-0.0098 (0.3124)	-0.0005 (0.9656)	-0.0003 (0.1095)
Financial Openness		-0.0317 (0.1948)	0.0006 (0.9541)	0.0113 (0.3395)	-0.0001 (0.9462)
Real Interest Rates		0.7919 (0.2646)	0.5146 (0.0639)*	0.9587 (0.0083)***	0.0085 (0.1750)
SP*Domestic Credit in SA(-1)		0.0566 (0.0478)**			
SP*Liquid Liability in SA(-1)			-0.2005 (0.0166)**		
SP*Bank Credit to Private Sector in SA(-1)				0.1577 (0.0039)***	
SP*Broad Money in SA(-1)					0.2105 (0.0066)***
Diagnostics tests	*R-sqd*	*0.9006*	*0.9570*	*0.9095*	*0.8575*
	AdjR-sqd	*0.8956*	*0.9549*	*0.9050*	*0.8505*
	F-stat	*180.265*	*452.43*	*204.16*	*122.26*
	Prob(F)	*0.0000*	*0.0000*	*0.0000*	*0.0000*

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

Table 6: GMM Estimation with Spatial Effects and Monetary Agreement Variables

Variable		Domestic Credit	Liquid Liability	Private Credit	Broad Money
Financial Development in SADC (-1)		0.9544 (0.0000)***	0.9906 (0.0000)***	1.0155 (0.0000)***	0.8554 (0.0000)***
GGDPPC		0.9716 (0.0132)**	0.2717 (0.0625)**	0.8398 (0.0002)***	0.0025 (0.4004)
Trade Openness		-0.0044 (0.7929)	-0.0094 (0.3067)	-0.0110 (0.2197)	0.0002 (0.0825)*
Financial Openness		0.0608 (0.9157)	0.3316 (0.2066)	-0.4172 (0.2256)	0.0129 (0.0111)**
Real Interest Rates		0.1206 (0.0016)***	0.0090 (0.5103)	0.0152 (0.4386)	0.0001 (0.5440)
SP*Domestic Credit in SA(-1)		-0.0134 (0.3732)			
SP*Liquid Liability in SA(-1)			0.0496 (0.0841)*		
SP*Bank Credit to Private Sector in SA(-1)				-0.0185 (0.3526)	
SP*Broad Money in SA(-1)					0.0706 (0.1007)
RMMA* Domestic Credit in SA (-1)		-0.5144 (0.5330)			
RMMA* Liquid Liability in SA(-1)			-1.0988 (0.2001)		
RMMA *Bank Credit to Private Sector in SA(-1)				0.0567 (0.9540)	
RMMA *Broad Money in SA(-1)					-2.1024 (0.1135)
Diagnostics tests	*R-sqd*	*0.8668*	*0.9426*	*0.8376*	*0.8520*
	AdjR-sqd	*0.8646*	*0.9417*	*0.8349*	*0.8325*
	D-W stat	*2.0703*	*2.2212*	*1.9900*	*1.9833*
	J-stat	*0.6202*	*0.9334*	*1.1143*	*0.7265*
	Prob(J)	*0.4310*	*0.3340*	*0.2911*	*0.3940*

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