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BANKING MARKET INTEGRATION IN THE SADC COUNTRIES: EVIDENCE FROM INTEREST RATE ANALYSES

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Keywords:	Banking Market Integration, Monetary Integration, Southern African Development Community, Interest Rate Pass-Through, Principle Components

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Banking market integration in the SADC countries: evidence from interest rate analyses

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This study investigates the state, development and drivers of banking market integration in the member countries of the Southern African Development Community. A principal component analysis of national retail interest rates indicates increasing integration in loan and deposit markets. These integration processes are not developing uniformly and we can identify a convergence club. When investigating the interest rate pass-through from central bank onto retail rates for this convergence club, we find both, genuine and monetary-integration driven processes though the latter dominate. We thus conclude that a selective expansion of the Common Monetary Area is possible.

JEL Classification Numbers: E42; E43; E52; E58; F36.

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1. Introduction

Economic and financial integration ranks high on the policy makers' agenda in Africa (Tsangarides and Qureshi, 2008). One of the prominent regional integration initiatives¹ is the Southern African Development Community (SADC) which has traditionally focused on trade and structural policies but has recently announced to aim at monetary unification by the year 2016 (Rossouw, 2006). It comprises such diverse countries as Angola, Botswana, The Democratic Republic of Congo, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe of which only four, namely South Africa, Lesotho, Swaziland and Namibia already form a Common Monetary Area (CMA). Most studies on the viability of this vision concentrate either on optimum currency area considerations or macro-economic (nominal) convergence (see Jenkins and Thomas, 1998; McCarthy, 2002; Khamfula and Huizinga, 2004; Kabundi and Loots, 2007; Rossouw 2006). As a complement to these exercises our study concentrates on the state and potential development of monetary and financial integration across Southern Africa.² We rigorously investigate the current state and underlying causes of banking market integration among SADC countries by bringing together two strands of the empirical financial integration literature, principal component analysis (PCA) and interest rate pass-through analysis (PTA), with a view to deriving policy conclusions on the readiness of countries for joining a monetary area or union based on monetary and financial integration criteria.

Financial integration can be measured in various ways. A prominent classification distinguishes quantity-based, price-based and news-based measures (Baele *et al.*, 2004). Quantity-based measures focus on cross-border transactions, such as cross-border loans and deposit taking or cross-border mergers and acquisitions. Because such data are unavailable for Southern African countries, price-based and news-based measures, which both utilize interest rates data, are preferable. Price-based measures of integration regularly use the law of one price as the point of reference. In the case of financial integration, the relevant parity conditions are

¹ Most of the regional alliances are focusing on common economic and trade policies, such as the Common Market for Eastern and Southern Africa and Economic Community of West African States, whereas the 14 member countries of the African Financial Community form two monetary unions, the West African Economic and Monetary Union and the Central African Economics and Monetary Community with a single central bank in each union and a single currency or peg to the French franc/euro, respectively.

² In choosing this point of view we also implicitly acknowledge the new strand of literature on endogenous optimum currency areas which starts with Rose (2001) and hypothesizes a potentially large positive effect of a common currency on trade. For a review of the related literature since the 1950s, see Dellas and Tavlas (2009).

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3 interest rate parity conditions. Price-based financial integration studies therefore often focus on
4 investigating convergence of comparable interest rates (Adam *et al.*, 2002). The law of one
5 price is appropriate when analyzing homogeneous assets but questionable for heterogeneous
6 assets that characterize retail banking markets. In the European context, Kleimeier and Sander
7 (2007) therefore advocate to investigate co-movements rather than convergence of retail
8 interest rates. While in a structurally stable environment this can be done by means of
9 cointegration analysis, for SADC countries it is more appropriate to analyse co-movements of
10 interest rates without expecting to find stable long-term relationships. We therefore apply a
11 PCA to deposit, loan and central bank (monetary policy) interest rates, in turn. This allows us
12 to identify sub-groups of countries for which interest rates move in the same direction. More
13 specifically, we consider a (sub-)group of countries to be integrated when their interest rates are
14 driven by one common principal component. When interpreting our results, the special role of
15 the central bank in the banking market must be considered. Here, the European experience has
16 made clear that in the presence of integrated money market rates or monetary policy rates, co-
17 movements of retail interest rates can easily be misread as sign of an integrated banking market
18 (Kleimeier and Sander, 2007). If central bank rates move together and monetary policy rates
19 changes are transmitted to retail rates in a uniform way in the various countries, then the
20 banking market *appears* integrated. This is the point where news-based measures come in.
21 They focus on the reaction of banking market interest rates to monetary policy signals.
22 Therefore an analysis of national interest rate transmission complements our analysis of
23 principle components.

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38 In this study we contribute to the literature by focusing on the state and development of
39 financial integration in SADC with special reference to banking market integration. In section
40 2, we review the state of financial integration in SADC as documented by the literature and
41 evidenced by standard convergence measures. In section 3 we investigate monetary and
42 banking market integration by applying a PCA to different time periods, i.e. rolling time
43 windows. This allows us to document the progress and development of financial integration
44 over time. In section 4, we scrutinize the driving forces of banking market integration and
45 single out the role of an efficient transmission of national monetary policy onto bank interest
46 rates or – if applicable – the role of a common or dominant monetary policy. The latter is
47 explored by investigating directly the transmission from South Africa to domestic banking
48 rates. In section 5 we conclude that the degree of financial integration in SADC is increasing in
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3 some but not all countries. While banking market integration is predominantly driven by
4 monetary integration, a genuine banking market integration process is also observable in some
5 countries. However, even this integration process is concentrated on a ‘convergence club’ with
6 CMA in its centre. Our analysis indicates that only a few SADC countries may become
7 potential candidates for a CMA enlargement, while many others are still far away from being
8 judged as candidates from a pure financial integration point of view.
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13 14 **2. Macroeconomic Non-Convergence versus Financial Convergence and Integration in** 15 **SADC** 16

17 *2.1. Macroeconomic non-convergence* 18

19 From the point of view of a classical optimum currency area approach, monetary
20 unification makes almost no sense. SADC comprises 15 countries³ which differ widely in terms
21 of development, macroeconomic stability, monetary and financial development and real and
22 financial integration. Of these countries four are currently member of the CMA and are thus
23 operating under a fixed exchange rate systems with the South African rand as anchor currency.
24 Botswana, that together with the four CMA countries forms the Southern African Customs
25 Union (SACU), has an independent exchange rate system but is indirectly linked to the rand
26 through a currency basket in which the rand accounts for 60 to 70%. The other 10 countries
27 (OTHER) are following largely differing exchange rate regimes.⁴ Table 1 gives an overview of
28 the development of some important real and financial development indicators of CMA, SACU
29 and OTHER. As expected, CMA shows the highest degree of macroeconomic convergence,
30 especially with respect to inflation. Botswana’s characteristics are in a similar range but the
31 diversity is much higher in the OTHER countries. Comparing SADC’s achievements with
32 respect to the Maastricht criteria for convergence and thus membership in the European
33 Monetary Union, Rossouw (2006:382) argues that “the challenges facing a SADC monetary
34 union would not be insurmountable if the convergence criteria are viewed as permanent goals,
35 rather than preconditions.” In contrast, Khamfula and Huizinga (2004:699) and Buigut and
36 Valev (2006) are less optimistic. While the former conclude that “a monetary union that
37 embraces all SADC members would amass large costs relative to the benefits and hence would
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52 ³ Seychelles was a member of SADC from 1997 to 2004, when it pulled out of the arrangement, but has since then
53 started negotiations to rejoin. Hence in the analysis it is treated as a SADC member.

54 ⁴ For a summary of exchange rate systems and restrictions on capital account transactions in SADC countries, see
55 Table A-1 in the appendix.
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3 not be desirable”, the latter point to South Africa’s resistance to a CMA expansion and
4 conclude that the CMA could easiest be expanded by Botswana, Mozambique and Zambia.

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6 Looking additionally at financial development (non)convergence as reflected by the
7 spread of lending over deposit rates as an indicator of banking market efficiency and financial
8 deepening indicators such as ratios of credit to Gross Domestic Product (GDP) and deposits to
9 GDP clearly shows the enormous diversity in financial development as well as the well-
10 documented financial underdevelopment in many Southern African countries.⁵ Clearly, South
11 Africa and Namibia have the most developed banking markets along with non-CMA member
12 Mauritius. Moreover, these measures improve slightly over time. Financial development is also
13 taking place in the remaining countries but is still at a very low level. Not much progress is
14 being made in the latter group with respect to the spreads. To the contrary, this efficiency
15 measure shows improvement in only very few countries and is still particularly high in the
16 OTHER countries.

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24 [Insert Table 1 about here]

25 26 27 28 2.2. *Financial convergence and integration in SADC: A brief review of the literature*

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30 The existing empirical studies on interest rates in Southern Africa focus either on
31 measuring integration by interest rate convergence or co-movement or on measuring the pass-
32 through. In an early study, Honohan (1992) investigate price and monetary convergence in
33 Africa during the 1980s. Regarding interest rates, Honohan singles out Lesotho’s banking
34 markets: While Lesotho’s interest rates do not converge to South African levels, there is clear
35 evidence that interest rates in Lesotho respond to South African rates. More recently,
36 Aziakpono (2008) and Nielsen *et al.* (2005) investigate the behaviour of national interest rates
37 by using the interest rate parity as an indicator of integration. Aziakpono’s (2008) findings
38 reveal a high level of dependence of the other SACU countries’ financial systems on South
39 Africa’s and he thus concludes that a monetary unification with a single central bank (South
40 African Reserve Bank) and monetary policy for the union is feasible. However, the success of
41 such a monetary union will critically depend on the efficiency gains of the domestic financial
42 system. Such gains are country-specific. For countries such as Botswana, Lesotho and
43 Swaziland with relatively weak domestic monetary policy transmission, a significant

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56 ⁵ Advanced countries typically have deposit to GDP and loans to GDP ratios around or even above 100%.
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3 improvement in their monetary transmission can be expected. However, in Namibia, where the
4 domestic policy seems to be more effective, a single central bank may actually lower the speed
5 of the monetary transmission process. These findings are in line with Nielsen *et al.* (2005) who
6 use the uncovered interest rate parity to assess the level of financial integration within the CMA
7 plus Botswana, Zambia and Zimbabwe. They find that Lesotho, Namibia and Swaziland are
8 well financially integrated with the South African market while the other countries are not.
9 Regarding South Africa's special role Aziakpono (2006) formulates and tests the South African
10 dominance hypothesis and the possibility of arbitrage activities within the SACU countries
11 using interest rates pass-through. The South African dominance hypothesis relates to the extent
12 to which monetary policy stance in South Africa is passed through to and reflected in the
13 monetary policy of the other countries while interest rate parity arising from profit-seeking
14 capital flows is regarded as evidences of arbitrage activities. His findings support the South
15 African dominance hypothesis and reveal a hierarchy of financial integration with South Africa
16 ranging from highly-integrated Namibia and Swaziland to less-integrated Lesotho and least-
17 integrated Botswana. Similar results are reported by Wang *et al.* (2007). The results suggest
18 policy convergence, rather than market convergence (arbitrage activities), as the main driver of
19 integration. In a related study, Sander and Kleimeier (2006) find a rather homogeneous
20 transmission process for lending rates and a less homogeneous one for deposit rates. Again
21 South African interest rates play an important role in the determination of national discount
22 rates, T-bill rates as well as commercial bank interest rates. They thus confirm the findings of
23 Aziakpono (2006) and Wang *et al.* (2007) and the validity of the South African dominance
24 hypothesis. While existing studies focus on the CMA or SACU countries, with exception of
25 Nielsen *et al.* (2005) who include Zambia and Zimbabwe, none of them has investigated the
26 extent of integration and the South African dominance hypothesis across the entire SADC. As
27 such, our study is also the first to provide directly comparable evidence for all SADC countries.
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46 2.3. Interest rate developments and convergence in SADC: Data and preliminary analysis

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48 We investigate the integration of central bank and retail banking markets by analyzing
49 the interest rates that are charged in these markets. Before we proceed with our two approaches
50 we briefly describe here the data and perform a number of integration tests that have been used
51 in the previously discussed literature. This allows us later to compare the results of our
52 approaches to those in the literature.
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We collect monthly interest rate series for all 15 SADC countries from the International Financial Statistics (IFS). We use discount rates provided in IFS series 60 as central bank rates, prime lending rates of series 60P as lending rates and series 60L as deposit rates. In general, our sample period covers January 1990 to December 2005 but several series have missing values. As Table 2 shows, interest rates tend to be lower in CMA and SACU than in OTHER countries. Furthermore, interest rates converge over time in CMA and SACU. This effect is most pronounced for CMA lending rates where the standard deviation across national lending rates drops from 3.5 in 1990 to 0.5 in 2005. For deposit rates, the drop in standard deviation is less substantial from 4.8 to 1.3. In contrast, the variations across interest rates of the OTHER countries increase over time and are substantially higher with, for example, a standard deviation of 55.3 for deposit rates and 130.5 for lending rates. Due to the exchange rate peg among CMA countries and – to lesser extent – Botswana, this result is not surprising.

[Insert Table 2 about here]

Fig. 1 illustrates the convergence of interest rates in SADC countries in more detail. Panel A shows sigma convergence by region for CMA, SACU, OTHER and SADC. Sigma convergence measures the development of interest rates dispersion over time. A reduction in the coefficient of variation across national interest rates indicates the existence of sigma convergence and thus signals integration. For CMA but also SACU the degree of dispersion drops substantially in the early 1990s but deposit rate dispersion starts to increase in late 2003 while lending rates stay closer together. For OTHER countries, sigma convergence is substantially weaker for all three interest rates showing not only higher but also very volatile dispersion across countries. Panel B shows beta convergence which measures how fast countries with initially relatively high interest rates adjust downward to the rate levels of benchmark countries with already low interest rates.⁶ Countries converging faster should thus have a more negative beta convergence coefficient than countries with already low interest rates. We report the degree of beta convergence for each country over the whole sample period

⁶ For applications of sigma and beta convergence measures to interest rates see Adam *et al.* (2002), Baele *et al.* (2004) and Kleimeier and Sander (2006). For an application to Southern Africa see Honohan (1992), Nielsen *et al.* (2005) and Wang *et al.* (2007). We calculate sigma convergence for each of our four regions as the monthly cross-country coefficient of variation across the region's countries. When calculating beta convergence, we follow Kleimeier and Sander (2006). We estimate the regression $\Delta z_{c,t+12} = \beta z_{c,t}$ where $z_{c,t}$ is defined as the difference in month t between the interest rate of country c and the South African interest rate. The change in this deviation over the coming 12 months is measured by $\Delta z_{c,t+12} = z_{c,t+12} - z_{c,t}$. A negative β coefficient thus indicates the existence of beta-convergence.

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3 from 1990 to 2005 relative to the South African interest rate. While there is evidence for beta
4 convergence for most countries and rates⁷, beta convergence tends to be higher for deposit and
5 bank rates than for lending rates. Furthermore, beta convergence is not necessarily higher in
6 CMA and SACU than in SADC. However, relatively low beta convergence in CMA-countries
7 compared to OTHER countries does not imply low integration in CMA as interest rates were
8 already substantially more homogeneous and lower in 1990 in CMA than in SADC. Thus a
9 more careful and detailed analysis of interest rates is warranted in order to draw the correct
10 conclusions about banking market integration in Southern Africa.
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16 [Insert Fig. 1 about here]
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18 Given the strong differences in financial intermediation, bank interest rates and spreads,
19 several questions arise when capital movements are not (fully) restricted: Are arbitrage
20 processes taking place across Southern African banking markets? To what extent are these
21 processes already effective in integrating Southern African banking markets? If retail banking
22 rate are in fact converging or co-moving, to what extent is this being mediated through co-
23 movements of monetary policy-determined interest rates? Are there any differences in
24 convergence in deposit markets compared to the typically more heterogeneous credit markets
25 which suffer more from informational asymmetries? To address these issues we go beyond
26 simple convergence analyses and try to provide answers on a country-by-country basis from
27 combining principle component and pass-through analyses results.
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36 **3. A Principal Components Analysis of Financial Integration**

37 *3.1. Methodology*

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39 In this section we investigate the development and extent of integration of both central
40 bank and retail interest rates by means of a PCA. PCA has its roots in the analyses of financial
41 integration based on interest rate levels. These generally follow one of two approaches. The
42 first was introduced by Cooper (1971) who examines the degree of divergence of interest rates
43 across countries based on their standard deviation. Similar to sigma convergence, here a lower
44 standard deviation of yields on similar assets indicates a higher the degree of financial
45 integration (Nellis, 1982). The second approach popularized by Logue *et al.* (1976) focuses on
46 the covariability of interest rates and does not require similarity of interest rate levels. Here, the
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54 ⁷ Only the beta convergence coefficients for lending rates of Madagascar and Mauritius relative to the South
55 African lending rate are not statistically significant at 10% or higher.
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3 degree of financial integration will be high if the covariability of interest rates and their
4 changes is high despite the fact that interest rate levels may differ substantially. As our analysis
5 in the previous section shows, this is the case for SADC countries and we thus follow this
6 second approach and assess the covariability of interest rates using PCA.⁸
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10 The aim of PCA is to obtain a small number of uncorrelated factors, called principal
11 components (PCs) that best account for the correlation among the interest rates in the different
12 countries. Let X represents a vector of interest rates in the CMA countries. PCA detects
13 banking market integration by converting a matrix of these rates into a linear combination of
14 unobserved PCs, which explain the complete variance of these interest rates. The PC problem
15 can thus be expressed as
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$$18 \quad P = AX \quad (1)$$

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20 where P is a vector of orthogonal factors or PCs which are a linear combination of the original
21 interest rate series X . X describes the m observed sets of interest rates variables and A is a
22 matrix of coefficients, called factor loadings, with each coefficient representing the weight of
23 the corresponding original variable in the relevant PC. The number of PCs is equal to the
24 number of the original variables. However, the PCs are orthogonal, i.e. independent of each
25 other. The PCA derives the PCs in such a way that they explain the variations in the set of
26 original variables in a descending order. Thus, the first PC accounts for the main part of the
27 variation in X ; the second PC will explain the main part of the remaining variations in X after
28 the effects of the first PC has been removed.⁹ If banking markets are integrated, the correlation
29 structure of the interest rates will be best described by one common factor explaining their long
30 run behaviour. But if banking markets are not integrated, there will be more than one PC
31 needed to explain the interrelations between bank interest rates.
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35 In order to determine the explanatory power of each PC, two measures are conventionally
36 used: eigenvalue and cumulative R^2 . To determine the significance of a PC we apply the Kaiser
37 rule of eigenvalue greater or equal to 1 (Kaiser, 1960).¹⁰ Next, to determine the relative
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48 ⁸ In addition to the contribution to the understanding of SADC banking markets, our study is thus also contributing
49 to the growing literature which assesses regional integration based on PCA (Nellis, 1982; Fernandez-Izquierdo and
50 Lafuente, 2004; Figueira *et al.*, 2005; Siliverstovs *et al.*, 2005; Perignon *et al.*, 2007; Gilmore *et al.*, 2008; Becker
51 and Hall, 2009).

52 ⁹ Note that the PCA makes no assumptions about the underlying properties of the data series X . Thus there is no
53 need for instance to determine the stationarity properties of each series.

54 ¹⁰ For a discussion of weaknesses and alternative rules see Jolliffe (2002:112-131). For applications see for
55 instance Nellis (1982), Figueira *et al.* (2005) and Meric *et al.* (2008).
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3 contribution of each country's interest rate to the significant PCs, we used the factor loadings
4 of the PCs. Note that the signs of the loadings are completely arbitrary (Jolliffe, 2002:67).
5 However, the pattern of variation of the signs from one factor loading to the other can be used
6 to determine the co-movement of the variables. In the context of our analysis, a largely random
7 factor loading (with differing signs and sizes) implies that the interest rates move largely
8 independently of each other, hence indicating low integration. The more systematic (same sign
9 and size) the factor loadings are the greater the degree of integration (Becker and Hall, 2009).
10 In addition, the pattern exhibited by a group of countries can be used to determine a
11 convergence group, i.e. countries that move in the same direction (having the same sign in the
12 same PC). Even though PCA is a static analysis, we follow Gilmore *et al.* (2008) and tailor the
13 PCA to a dynamic analysis to examine the progress and development of banking market
14 integration over time. This is accomplished by estimating the models for rolling time windows
15 of five years each and observing the pattern over time. We thus analyse 12 samples from
16 January 1990 to December 1994, January 1991 to December 1995 and so on until January 2001
17 to December 2005.

3.2. Evidence from principal component analyses

31 Tables 3 and 4 summarize the PCA results.¹¹ Table 3 reports the cumulative R^2 of the
32 first PC. The results are reported by regional group as well as by interest rate. Table 4 reports
33 the summary results of the convergence group analysis based on the factor loadings of
34 significant PCs for the period 2000 to 2005 which combines the last two rolling windows.

[Insert Table 3 about here]

39 As expected the banking markets in CMA followed by SACU are more integrated than
40 the rest of SADC. In CMA with the exception of 1996-2000 for the central bank rate, there is
41 only one significant PC in all the rolling windows. In all the cases, the first PC has a high
42 explanatory power, explaining on average 82%, 87% and 86% of the variations in central bank,
43 deposit and lending rates, respectively. Both retail rates exhibit stronger evidence of
44 convergence and integration than the central bank rate. Also, as is evident from the results, the
45 level of banking market integration among the CMA countries is relatively stable over time,
46 except for the second half of the 1990s (1995-1999 and 1996-2000 rolling periods). The drop in
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54 ¹¹ Additional results of the PCA – as well as detailed results for the PTA – can be found in the working paper
55 version of this study available as METEOR Research Memorandum RM07047 at <http://edocs.uu.unimaas.nl/>.

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3 the level of integration was due to financial distress and political crisis in Lesotho during that
4 period (see Aziakpono, 2004).
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6 The banking markets in the SACU countries are also highly integrated though to a lesser
7 extent than the CMA countries. In most rolling periods, one significant PC is found. With 74%
8 to 75%, the explanatory powers of these first PCs are quite high. Again, the retail bank rates
9 show stronger evidence of convergence. The level of banking market integration however
10 varies slightly over time. Similar to the CMA countries, SACU's banking markets experience
11 the least integration during the second half of the 1990s, especially during the 1995-1999
12 rolling window.
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18 The level of banking market integration in the OTHER region is relatively low compared
19 to SACU. However, unlike CMA and SACU where the retail bank rates lead the integration
20 process, in the OTHER countries the central bank rate leads the integration process followed by
21 lending rates. With an average of 55%, 45% and 52% for central bank, deposit and lending
22 rates, respectively, the explanatory powers of the first PCs are low. Likewise, there are mostly
23 two or more significant PCs. Finally, the results for the entire SADC region are quite similar to
24 OTHER. It is also evident that in last two rolling windows, especially when compared to the
25 immediate past window, the degree of banking market integration increases in the entire
26 SADC.
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33 We subject all SADC countries to further analyses focusing on the period between 2000
34 and 2005 where there is some evidence of growing integration in more recent years especially
35 in the entire SADC.¹² Our aim is to sort the countries into groups that are becoming integrated
36 based on the similarities of their movements. Since our earlier analyses show that the CMA
37 countries are highly integrated we pay attention to those countries of the SADC that are
38 converging to the CMA countries which can together form part of an expanded CMA. Hence,
39 the analysis will shed light on the prospect for a SADC-wide monetary union. The estimation is
40 carried out for each of the three interest rates but we retain only the significant PCs for
41 analysis. Countries with high factor loadings and with the same sign in the same PC are
42 regarded as moving together and are thus grouped together. Following an iterative approach
43 suggested by Jolliffe (2002), we subject such a group to further analysis. If the countries in the
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53 ¹² Though the results did not show a monotonically increasing pattern for the entire period across the interest rates,
54 we have chosen the 2000-05 periods for this analysis to coincide with a period where there is some evidence of
55 consistent increase in the level of integration in the entire SADC as revealed by the R².
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3 group are truly integrated, a further PCA should produce only one significant PC. If not, the
4 process continues until we obtain a single dominant PC that explains most of the variation in
5 the interest rates.
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8 The results for the central bank rates of 12 countries are shown in Panel A of Table 4.
9 The eigenvalues reveal that there are three significant PCs explaining about 86% of the
10 variation in central bank rates, while the first PC (PC#1) alone explains 61%. Looking at the
11 factor loadings of PC#1 in the full sample, one can easily identify seven countries with high
12 coefficients and equal signs. These seven countries constitute Group 1. Further estimation
13 produces only one significant PC, which explains 79% of the variations in the central bank
14 rates. Though Zambia appears to have a high coefficient with the same sign as the other seven
15 countries in PC#1, its coefficient also dominates the third PC (PC#3) of the full sample. In
16 addition, when Zambia's central bank rate is included in Group 1, two significant PCs are
17 found. Hence, Zambia is excluded from Group 1. Though the factor loading for Botswana in
18 PC#1 moves in the same direction as those of the countries in group 1, its coefficient dominates
19 the second PC. When adding Botswana's central bank rate to Group 1, two significant PCs are
20 found. Hence, Botswana is removed from Group 1. In the subsequent PCA, though factor
21 loadings for Botswana are highest, the factor loadings for Madagascar and Tanzania are equally
22 high, but both move in the opposite direction compared to Botswana. The three countries'
23 central bank rates are estimated, but the results produced two significant PCs, with one
24 dominated by Botswana and the other by Madagascar and Tanzania. Hence, it is apparent that
25 Botswana is not in same group as the other two countries. Estimation for the two countries
26 results in one significant PC explaining 80% of the variations in rates. An outlier is Zimbabwe
27 whose factor loading dominates the fourth PC of the full sample. Overall, with regards to the
28 central bank rates, we can identify five groups of countries that tend to move in different
29 directions. The dominant group, group 1 comprises the CMA countries plus Angola, Malawi
30 and Seychelles. Group 2 comprises Madagascar and Tanzania, while the other three countries,
31 Botswana, Zambia and Zimbabwe, are largely independent.
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48 In the case of deposit rates reported in Panel B, we identify five groups of countries
49 moving in different directions. In Group 1 there are seven countries, including the SACU
50 members plus Seychelles and Zambia. The results of the PCA for lending rates for 14 countries
51 are reported in Panel C. The iterative analysis suggests also five groups of countries that move
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3 differently. The first group comprises of eight countries, which are the CMA members and
4 Angola, Malawi, Seychelles and Zambia.
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6 In summary, the convergence-group analyses suggest that some countries are showing
7 signs of convergence with the CMA countries towards the end of our sample period (see Table
8 5). Prominent among them is Seychelles which converges in all three markets. Angola, Malawi
9 and Zambia show convergence in two out of the three markets. In Botswana, convergence only
10 occurs in the retail deposit market. A number of countries such as Madagascar, Mozambique
11 and Tanzania seem to be moving together in pairs, but not with the CMA countries. Lastly, a
12 few countries behave independently of the others. Notable among them are Zimbabwe and
13 Mauritius. The central bank rates in Botswana and Zambia also behave in that fashion.
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19 [Insert Table 4 and Table 5 about here]
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23 **4. Pass-Through Analysis of Financial Integration**

24 *4.1. Methodology*

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26 An integration (or disintegration) process of retail banking can be driven by monetary
27 integration or by genuine banking market integration mediated through cross-border arbitrage.
28 Thus and secondly, we investigate the driving forces of banking market integration by means of
29 a PTA. If monetary integration leads to a convergence of central bank rates this will result
30 statistically in more retail interest rate convergence – unless the transmission to retail rates is
31 becoming more heterogeneous across the countries. However, this is not a genuine banking
32 market integration driven by cross-border arbitrage. Moreover and with respect to South
33 African dominance hypothesis, the South African Reserve Bank could have a direct and
34 unidirectional impact on monetary policy rates in another country. If then an efficient
35 transmission exists in South Africa and the respective other country, the banking markets also
36 appear to be integrated by means of *monetary policy convergence* rather than a genuine
37 *banking market convergence*. Finally, a variant of the South African dominance hypothesis
38 could envisage a direct impact of South African monetary policy rates on bank interest rates in
39 third countries even without monetary integration when banks orient their pricing policy to
40 South African policy rate. Next to the national pass-through we therefore also investigate the
41 pass-through from South African central bank rates to national retail rates.
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53 The pass-through methodology is closely based on Sander and Kleimeier (2004, 2006)
54 who model the PTA as the following vector autoregressive (VAR) process:
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$$RR_t = \beta_0 + \sum_{i=1}^{k^*} \beta_{RR,i} RR_{t-i} + \beta_1 CBR_t + \sum_{i=1}^{n^*} \beta_{CBR,i} CBR_{t-i} + \varepsilon_t \quad (2)$$

where CBR_t is the central bank's policy rate and RR_t represents the commercial banks' retail rate which can be either a lending rate (LR) or a deposit rate (DR). The optimal lag length is indicated by k^* and n^* , respectively, and determined according to the AIC criterion over all combinations of lags up to a lag length of 4. Based on this representation of the PT process, the responsiveness of retail rates to monetary policy rates can be measured over various time horizons. The impact multiplier, as given by the coefficient β_1 , measures the immediate adjustment within the current month. Here a value of $\beta_1 < 1$ indicates sluggish adjustment, also known as interest rate stickiness. At the other end of the time horizon, the long-term multiplier can be calculated from (2) as

$$\theta = \frac{\beta_1 + \sum_{i=1}^{n^*} \beta_{CBR,i}}{1 - \sum_{i=1}^{k^*} \beta_{RR,i}} \quad (3)$$

In the long run Eq. (2) therefore has the form of

$$RR_t = \theta_0 + \theta CBR_t + u_t \quad (4)$$

If $\theta=1$, we speak of a full PT in the long run. Switching costs, information asymmetries, not fully elastic credit demand functions, imperfect competition and other market imperfections can cause an imperfect PT, in which case we will find $\theta < 1$. $\theta > 1$ can represent times when banks do not ration credit supply but increase lending rates to compensate for higher risks.¹³

As is common for interest rate time series, the monetary policy and retail rates used in this study exhibit an I(1) property – that is, they are nonstationary series that do not return to any mean value and that have with time increasing variances.¹⁴ In this case, PT models like Eq.

(2) are regularly estimated in first differences to avoid spurious regression problems:

¹³ In contrast to our symmetric PT model, asymmetric PT models have for example been applied by Gambacorta and Iannotti (2007) or Sander and Kleimeier (2004, 2006). Asymmetric PT models are most useful when investigating the internal structure of the banking market as they provide detailed information about the - possibly asymmetric - short- and medium term adjustment of interest rates. For the long-run, however, they estimate the same multiplier as presented here in equation (4). As we will mainly focus on this long-run multiplier as our indicator for integration, we prefer the simpler symmetric PT model.

¹⁴ In contrast, I(0) or stationary series have a limited variance and fluctuate around their mean. By differentiating an I(1) series, a I(0) series is obtained. We employ various tests to establish whether the interest rate series are I(1) or I(0). For each rolling sample period, we conduct ADF and DG-GLS unit root tests. For the full period, we additionally estimate mean-shift, trend-shift and recursive unit root tests which are valid even in the presence of a

$$\Delta RR_t = \beta_0 + \sum_{i=1}^{k^*} \beta_{RR,i} \Delta RR_{t-i} + \beta_1 \Delta CBR_t + \sum_{i=1}^{n^*} \beta_{CBR,i} \Delta CBR_{t-i} + \varepsilon_t \quad (5)$$

It should be noted that by doing so, important information about the long-run relationship is lost. Eq.(2) can, however, be estimated directly and will contain the long-run information if both interest rates are cointegrated in the sense of Engle and Granger (1987).¹⁵ The deviation from the long-run equilibrium will then be measured by the estimated error u_t from Eq. (4) and included in the PT model as a lagged error correction term (ECT):

$$\Delta RR_t = \beta_0 + \sum_{i=1}^{k^*} \beta_{RR,i} \Delta RR_{t-i} + \beta_1 \Delta CBR_t + \sum_{i=1}^{n^*} \beta_{CBR,i} \Delta CBR_{t-i} + \beta_{ECT} ECT_{t-1} + \varepsilon_t \quad (6)$$

As motivated above, we investigate not only the effects of domestic monetary policy but also the impact of the South African monetary policy on national retail rates. In CMA, commercial banks adjust their lending and deposit rates to a common monetary policy rate and may even adjust more directly to changes of the South African than to national policy rate. We thus expect β_1 and θ to be nonzero for CMA. Beyond more or less fixed pegs to the rand, a significant response of retail rates to South African central banks rates is of course much less likely but cross-border arbitrage can manifest itself when for the OTHER countries β_1 and θ are relatively large in response to South African policy rates and relatively small in response to national policy rates.

4.2. Evidence from pass-through analysis

We investigate all SADC countries from 1990 to 2005 using the same five-year rolling windows as for the PCA. Fig. 2 summarizes our findings for the national PTA by showing the average long-run multipliers and their variation in SADC and the sub-regions.¹⁶ Our results show that the transmission onto deposit rates is generally less than perfect with the long-run

structural break (Banerjee *et al.*, 1992). Results can be found in the working paper. Our tests indicate that the series are I(1) but there are a few exceptions. As we however do not encounter cases where both the monetary policy rate and the retail rate are I(0), we always estimate the PT in first differences.

¹⁵ We employ two types of tests in order to determine whether or not monetary policy and retail rates are cointegrated. First, we estimate the usual Durbin-Watson (DW), Dickey-Fuller (DF) and augmented Dickey-Fuller (ADF) tests. Cointegration is considered to exist if at least two test statistics are significant at 10% level or one test statistic at 5% level. Second, we follow Kremers, Ericsson and Dolado (1992) and consider cointegration to exist when the coefficient of the lagged error correction term (ECT_{t-1}) is significant at the 5% level in Eq. (6). If one of both of these test procedures indicates cointegration, we estimate the PT as (6). Only if both of these test procedures reject cointegration is the PT estimated as (5). To avoid switching too frequently between these two PT models, i.e. for our overlapping sample periods, exceptions are made for single periods. Details can be found in working paper.

¹⁶ For specific national multipliers see Table A-3 in the working paper.

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3 multiplier dropping substantially below the full PT value of 1 to a level below 0.6. Remarkably,
4 this is not a single phenomenon in some groups but happens in all subgroups of SADC
5 countries. Consequently, the coefficient of variation remains rather stable over the investigated
6 period, suggesting that the PT-heterogeneity within both SADC and the subgroups does not
7 change much over time. The only exemptions are the OTHER countries. Here we find episodes
8 of increased heterogeneity in the mid-1990s and early 2000s, suggesting a sensitivity of the
9 pass-through to changes in the macroeconomic and regulatory environment.¹⁷ The reduction in
10 the pass-through, in an advanced economy regularly interpreted as a signal of market
11 imperfections, is in the Southern African context predominantly linked to financial
12 deregulation with respect to interest rates. In fact, by European standards a long-term pass-
13 through of 0.6 for deposit rates is quite high. But it should also be noted that high inflation (at
14 least above a certain threshold) typically leads to a high pass-through. With respect to loan
15 rates we also find (partly for similar reasons) a reduction in the long-run average pass-through
16 below the benchmark of 1. Here, however, we clearly document a strong difference between
17 CMA and SACU on the one hand and the OTHER countries on the other hand. The former
18 groups exhibit a strong transmission with South Africa often having a full pass-through, while
19 in the latter group the interest rate transmission is rather limited with an average long-run
20 multiplier of close to 0.4 which may indicate serious banking market imperfections.
21 Consequently, CMA and SACU have a much more homogenous PT than the others, although
22 the heterogeneity increased somewhat during the later periods across all SADC countries.
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36 [Insert Fig. 2 about here]

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38 In order to test for PT-differences between CMA, SACU and OTHER we adopt a simple
39 dummy regression approach. We regress the multipliers of different time horizons on a CMA
40 and a Botswana dummy and use additional time dummies for the rolling time periods (with the
41 rolling period 2001-2005 as benchmark). These regressions are reported in Table 6 and reveal
42 that the lending rate transmission is significantly faster (between 0.24 and 0.35 points) and
43 more complete (plus 0.24) in the CMA countries than in the OTHER countries. In Botswana
44 the transmission is only faster (up to 0.22 points) but not more complete. Moreover, the
45 impression of a more efficient transmission in the second half of the 1990s that can be
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53 ¹⁷ With respect to the short-run multipliers (not shown in Fig. 2) note that the long-run values of the average
54 multipliers are almost reached after three months. However, the 3-months multipliers show a slightly higher
55 variability across countries.
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3 interfered from Fig. 3 is confirmed by the regression. With respect to deposit rates the pass-
4 through in the CMA is speedier but not more complete. No significant effects are found for
5 Botswana – at least at a 5% confidence level or higher.
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8 [Insert Table 6 about here]

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10 To highlight the drivers of banking market integration we concentrate in the following on
11 those countries identified by the PCA in Table 5 as Group 1. As expected, all four CMA
12 members belong to this convergence group and exhibit not only a fast but also (almost) perfect
13 transmission for lending rates. This pass-through is furthermore heavily influenced by South
14 African central bank rates. For the cross-border transmission from South Africa rates, the long-
15 run multipliers for Group 1 are shown in Fig. 3.¹⁸ The long run pass-through in the most recent
16 period of investigation in Namibia is 0.8 for the national policy rate and 0.72 for the South
17 African policy rate. In Swaziland, the values are 0.93 and 0.86, respectively, while lending
18 rates in Lesotho directly and exclusively respond to South African rates, possibly a
19 consequence of the financial distress in this country alluded to earlier. With respect to deposit
20 rates the situation is similar. The highest long-term PT is found in South Africa (0.86). In the
21 other CMA countries the PT from national rates is only marginally faster than the transmission
22 from South African policy rates (Namibia: 0.43 versus 0.38, Swaziland 0.74 versus 0.74,
23 Lesotho is again mainly responding to the South African rate with a coefficient of 0.24). In
24 sum, it appears that banking market integration is following monetary integration. Thus, South
25 African monetary policy plays a dominant role in banking market behaviour. The PTA
26 evidence is therefore fully in line with the PCA evidence that groups all CMA countries into
27 one convergence group for all three interest rates. We also find here more evidence for
28 integration in lending rather than deposit markets, particularly for Namibia. This is again in line
29 with the results based on principle components which found least convergence in deposits.
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43 At the other extreme we have Botswana and Zambia who also belong to Group 1 but
44 appear to be driven by banking market integration only. This process can be completely
45 mediated through banking market arbitrage and is as such been detect by the PCA. Potentially,
46 capital account convertibility in both countries drives these developments. Given the fast and
47 (almost) complete pass-through in South Africa, the national banking rates should then also
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52 ¹⁸ By focussing on the transmission from South Africa's central bank rates to national interest rates, we follow
53 Aziakpono (2006). He finds that policy convergence exists among CMA countries while market convergence is
54 lacking possibly due to the absence of arbitrage opportunities resulting from both poor institutional development
55 and lack of investment opportunities.
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3 exhibit a statistically significant relationship with South African policy rates. In fact, Zambia's
4 deposit and lending rates are increasingly related to South African central bank rates as is
5 Botswana's deposit rate, though at a very low level.
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8 In the remaining countries of the convergence Group 1 we find both monetary and some
9 banking market integration. The Seychelles are the only non-CMA member of the Group 1
10 convergence club with respect to all three interest rates. As such, both an efficient national PT
11 as well as a link to South African rates may be important. In fact, the Seychelles' lending rate is
12 responding to the national central bank rate, as can be seen from a small long-run multiplier of
13 0.54 in the most recent rolling period, but is also cointegrated with the South African policy
14 rate with a most recent long-run multiplier of 0.19. The long-run responses of the deposit rate
15 to national and South African policy rates are in a similar range with multiplier values of 0.57
16 and 0.19, respectively. Angola and Malawi are in Group 1 with respect to central bank rate and
17 lending rates. In fact, we find their lending rates to be cointegrated with the South African
18 policy rate while deposit rates are not consistently cointegrated over time. The (too) high
19 multipliers are however difficult to interpret and may reflect the fact that national policy rates
20 that still largely diverge from the South African ones.
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30 A puzzle is why we find less convergence in deposit markets than in the typically more
31 heterogeneous credit markets which suffer more from informational asymmetries? In order to
32 explain this deposit puzzle, note that deposits to GDP are generally higher than credits to GDP
33 in SACU countries. This suggests a relatively liquid banking sector in which banks are
34 competing for loans but not deposits. Anecdotal evidence also supports this view: Customers
35 are more reluctant to change banks when it comes to holding deposit accounts due to
36 transaction costs. In some instances customers do not even have a choice as their salaries are
37 paid to a particular (domestic) bank. In contrast, loan markets are more competitive as
38 customers can easily move to a bank with better rates. First, loan markets are dominated by
39 corporate borrowers as banks ration loans to poor individuals and small businesses which they
40 consider to be highly risky. Second, many companies operating in the SADC countries are
41 from South Africa. They can as easily borrow from banks in South Africa as from banks in the
42 country where they operate and thus engage in interest rate arbitrage. As such our findings are
43 in line with behavioural pattern observed in the region.
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53 [Insert Fig. 3 about here]
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5. Conclusions

This study sets out to investigate the state, development and drivers of banking market integration in Southern African Development Community member countries using interest rate data. Banking market integration can be a market-determined process and/or driven by monetary integration. We find evidence for increasing monetary integration and banking integration in loan and deposit markets. Integration is, however, not developing uniformly but concentrated in only a few countries.

The evidence suggests that the CMA countries are ready for further integration when judged from the point of view of financial integration only. Additionally, Seychelles show a good potential for joining the CMA and their further deepening towards a monetary union. In fact, Seychelles has a high financial development with respect to deposit and low interest rate spreads. They do, however, still have an underdeveloped credit market both in absolute terms and in relative terms in relation to CMA. Zambia and Botswana are also potential candidates for a CMA expansion¹⁹ as there is already some integration evidence for banking markets. These two countries orient themselves to some extent at South African policy rates, but low levels of financial development and efficiency require particular attention of financial development and competition policies. This applies even more to Angola and Malawi who both show some signs of integration but with even worse financial development and financial efficiency indicators. For the remaining countries, financial integration indicators do not yet point to a readiness for CMA membership.

We therefore conclude that a selective and cautionary expansion of CMA is possible. Seychelles, Zambia and Botswana are potential first candidates. Other likely candidates include Angola and Malawi. Such an expansion, however, requires not only more policy coordination and nominal convergence but financial market imperfections need also to be addressed. When putting monetary and financial integration high on the Southern African Development Community's policy agenda, policy makers envision the merits of a currency union and the potential endogenous integration effects of it. While an extensive analysis of the cost and benefits of a common Southern African currency is beyond the scope of our study, the message from our analyses is that financial development policies will have to be a central part of their integration vision.

¹⁹ Buigut and Valev (2006) also favour these two countries.

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Appendix

[Insert Table A-1 here]

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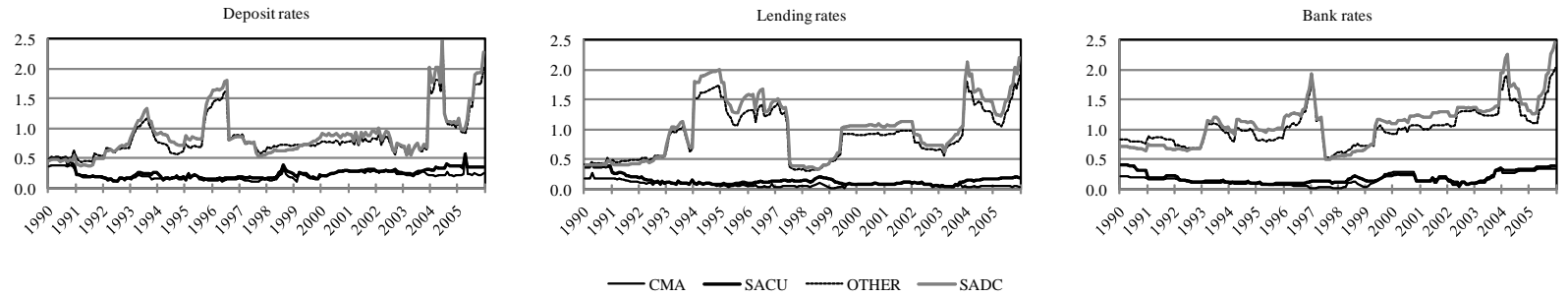
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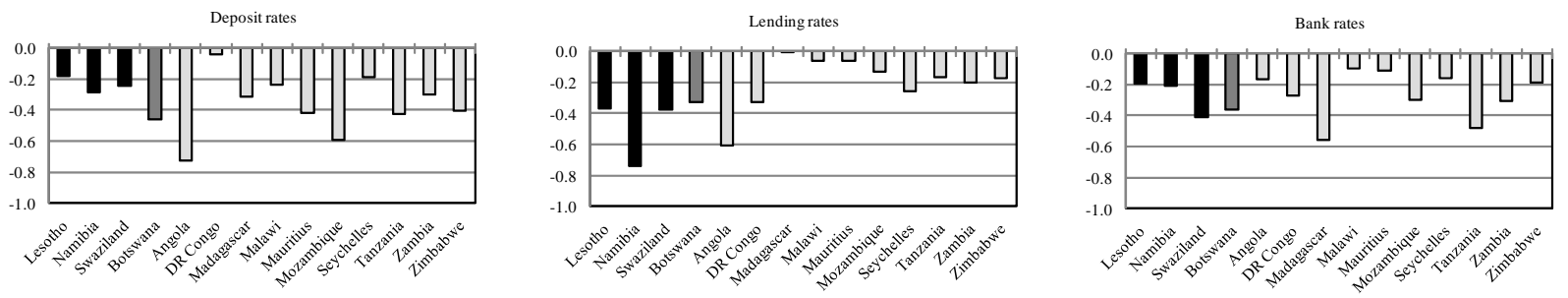
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Fig. 1: Banking market integration in SADC

Panel A: Sigma convergence



Panel B: Beta convergency

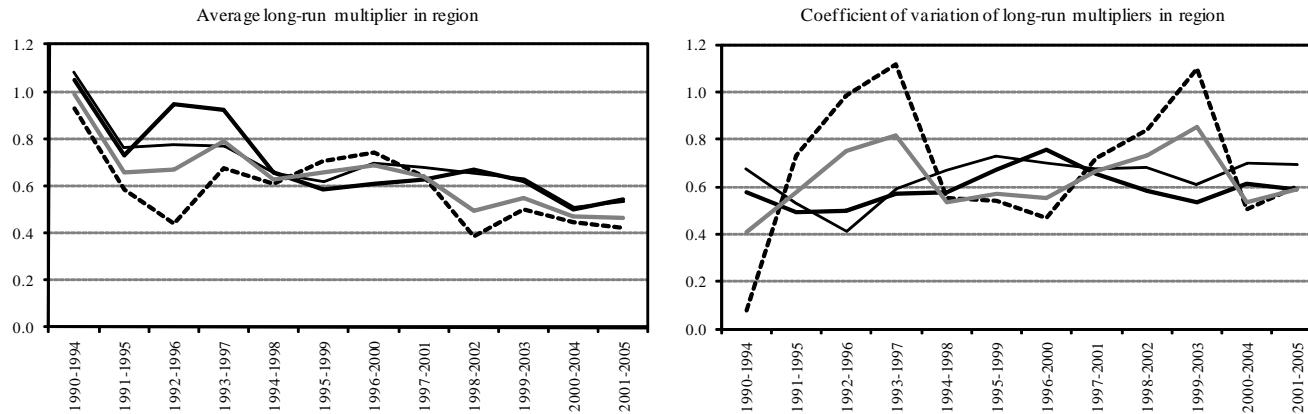


Notes: The regional groups comprise the following countries: CMA = Lesotho, Namibia, South Africa, Swaziland; SACU = CMA plus Botswana; OTHER = Angola, DR Congo, Madagaska, Malawi, Mauritius, Mozambique, Seychelles, Tanzania, Zambia, Zimbabwe. In Panel A, CMA is highlighted in black, Botswana as only additional SACU country in dark grey and the OTHER countries in light grey. Beta convergence is measured for 1990 to 2005 relative to the respective South African interest rate. In Panel B, the development of the monthly coefficient of variation across the different countries in the respective regional group is shown.

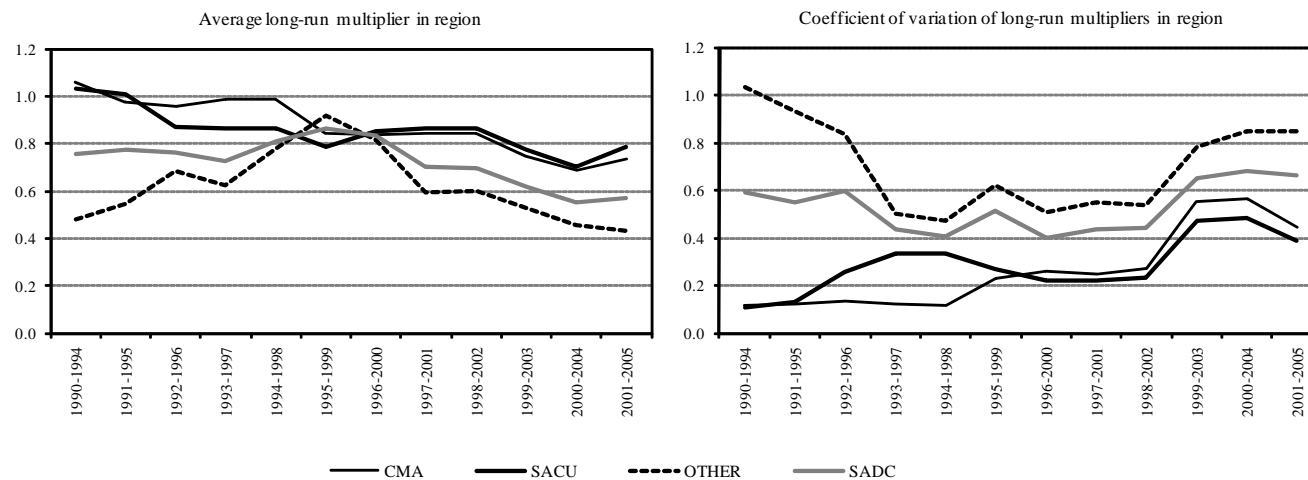


Fig. 2: The pass-through of national bank rates to national deposit and lending rates

Panel A: Deposit rates



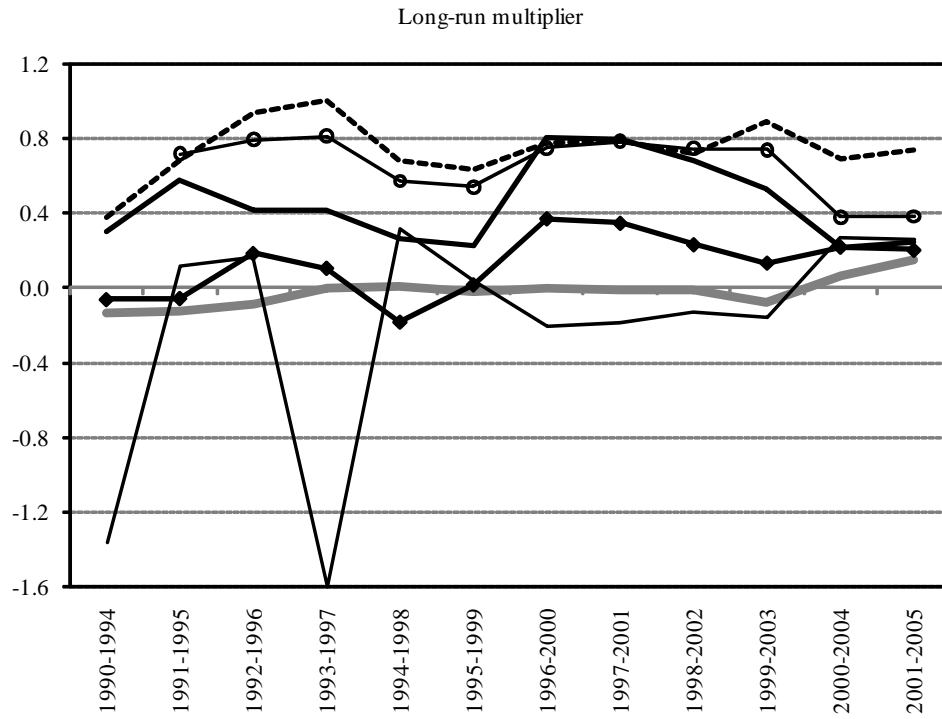
Panel B: Lending rates



Notes: The regional groups comprise the following countries: CMA = Lesotho, Namibia, South Africa, Swaziland; SACU = CMA plus Botswana; OTHER = Angola, DR Congo, Madagaska, Malawi, Mauritius, Mozambique, Seychelles, Tanzania, Zambia, Zimbabwe.

Fig. 3: The role of the South African central bank rate for national retail rates

Panel A: Deposit rates



Panel B: Lending rates

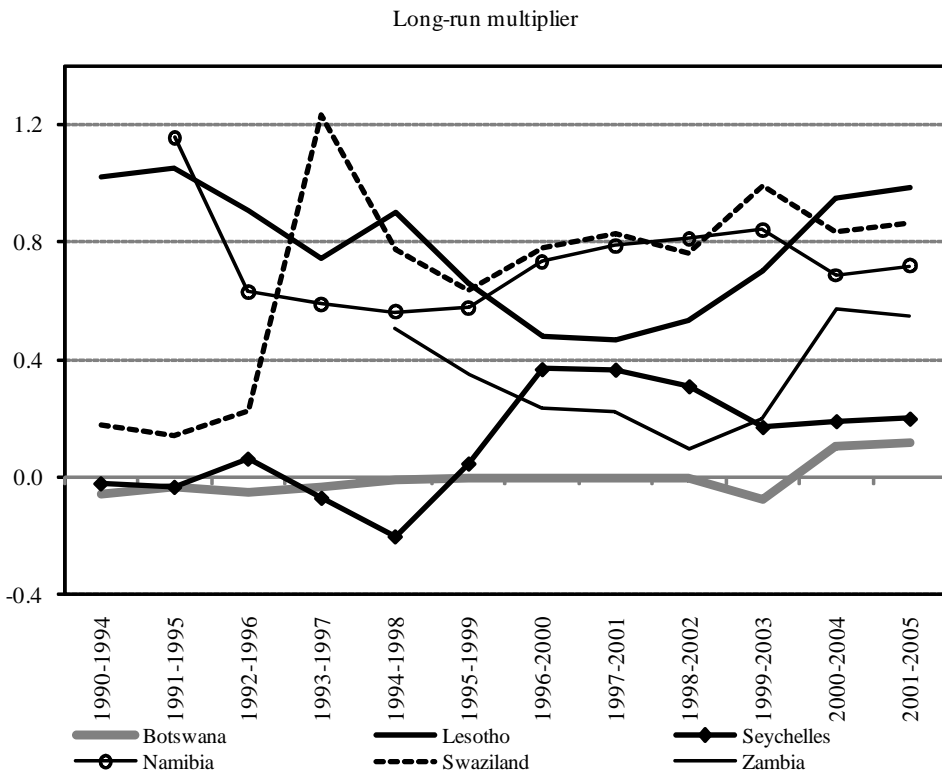


Table 1: Economic conditions and financial development in SADC countries

		SACU					OTHER								
		CMA		South Africa	Swazi-land	Bots-wana	Mada-gascar	Malawi	Mauri-tius	Mozam-bique	Sey-chelles	Tanzania	Zambia	Zim-babwe	
		Lesotho	Namibia				Angola								
real GDP growth	1990-1994	4.4%	4.4%	0.2%	3.9%	4.4%	-5.9%	0.0%	1.3%	5.3%	4.4%	4.5%	2.5%	-0.8%	2.8%
	1995-1999	3.6%	3.6%	2.6%	3.7%	8.0%	7.9%	3.2%	6.9%	4.9%		3.4%	3.8%	1.5%	2.5%
	2000-2005	2.6%	4.6%	3.9%	1.9%	5.3%	9.3%	2.9%	2.6%	4.2%		1.2%	6.5%	4.6%	-6.1%
inflation	1990-1994	13.6%	12.2%	12.4%	11.1%	12.8%	677.7%	16.8%	21.1%	8.6%	46.2%	2.5%	29.0%	121.7%	26.5%
	1995-1999	8.1%	8.3%	7.3%	8.0%	8.7%	1478.3%	17.9%	40.9%	6.6%	22.9%	1.6%	17.2%	30.7%	30.6%
	2000-2005	7.6%	7.2%	5.1%	7.6%	8.0%	126.1%	11.0%	17.2%	4.9%	12.0%	3.4%	4.0%	21.2%	90.9%
spreads	1990-1994	7.1%	8.9%	3.9%	6.0%	1.7%		5.8%	7.1%	6.8%		6.3%	14.5%	16.3%	2.1%
	1995-1999	6.8%	7.5%	4.9%	7.4%	4.7%	42.3%	15.8%	15.3%	9.6%	14.5%	6.5%	17.2%	17.1%	12.2%
	2000-2005	10.4%	6.2%	4.9%	7.0%	6.0%	58.6%	11.9%	22.1%	12.0%	10.4%	6.5%	12.4%	19.7%	73.7%
credit to GDP	1990-1994	17.8%	33.0%	44.5%	23.1%	13.6%		16.3%	10.9%	38.5%	12.5%	7.9%	11.6%	6.2%	17.4%
	1995-1999	17.6%	46.9%	64.1%	16.5%	12.5%	3.9%	9.7%	4.9%	50.8%	13.0%	13.4%	4.5%	7.6%	23.1%
	2000-2005	10.2%	47.9%	67.3%	14.8%	18.4%	4.4%	9.0%	5.9%	64.1%	13.0%	24.0%	7.0%	7.0%	20.3%
deposits to GDP	1990-1994	33.6%	31.1%	47.1%	27.8%	19.4%		15.2%	16.4%	61.4%	21.3%	42.5%	15.3%	14.6%	17.6%
	1995-1999	30.7%	42.0%	51.0%	23.1%	23.7%	16.0%	13.9%	12.9%	71.2%	18.3%	73.3%	14.3%	14.9%	21.8%
	2000-2005	24.7%	39.9%	53.7%	18.9%	27.1%	14.9%	15.5%	15.7%	81.5%	24.5%	95.8%	17.0%	18.5%	30.0%

Notes: This table shows the average country characteristics. Spreads are calculated as lending rates minus deposit rates. Data source are: Datastream. Real GDP growth is obtained from The Economist year-on-year change in real GDP series (DGDP..). For Lesotho, Madagascar, Seychelles and Swaziland these series are missing and the IFS line 99 data is used instead. Inflation is based on CPI from IFS line 64. Credit to GDP is calculated as IFS line 22d in percent of nominal GDP (line 99B..A). Correspondingly deposits to GDP are calculated as IFS line 24 plus 25 in percent of nominal GDP. Note that observations for some countries and years are missing. The regional averages are weighted averages of the national data. Weights are own calculations based on real GDP measured in international dollars in the year 2000 obtained from Alan Heston, Robert Summers and Bettina Aten, Penn World Table Version 6.2, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, September 2006.

Table 2: Interest rate developments

	average		minimum		maximum		standard deviation	
	1990	2005	1990	2005	1990	2005	1990	2005
Panel A: Bank rates								
SADC	16.1	59.4	6.5	3.9	45.0	540.0	11.5	146.3
CMA	16.0	8.5	12.0	7.0	18.0	13.0	3.5	3.0
SACU	13.6	9.7	6.5	7.0	18.0	14.5	5.5	3.7
OTHER	18.1	90.5	9.0	3.9	45.0	540.0	15.1	183.9
Panel B: Deposit rates								
SADC	12.7	19.6	5.5	3.1	25.0	174.0	5.9	44.6
CMA	13.5	5.2	8.9	3.9	18.5	6.6	4.8	1.3
SACU	11.5	6.0	5.5	3.9	18.5	9.1	5.6	2.1
OTHER	13.7	27.1	8.3	3.1	25.0	174.0	6.6	55.3
Panel B: Lending rates								
SADC	18.4	48.1	8.0	10.1	33.8	415.0	7.5	106.1
CMA	18.5	10.8	14.5	10.5	21.0	11.5	3.5	0.5
SACU	15.9	11.9	8.0	10.5	21.0	16.0	6.0	2.4
OTHER	20.4	68.3	11.5	10.1	33.8	415.0	8.6	130.5

Notes: The regional groups comprise the following countries: CMA = Lesotho, Namibia, South Africa, Swaziland; SACU = CMA plus Botswana; OTHER = Angola, DR Congo, Madagaska, Malawi, Mauritius, Mozambique, Seychelles, Tanzania, Zambia, Zimbabwe.

Table 3: The explanatory power of the first principle component

Period	Cumulative R ² of the first principle component			
	CMA	SACU	OTHER	SADC
Panel A: Bank rates				
1990-1994	0.841	0.706	0.637	0.635
1991-1995	0.792	0.705	0.656	0.492
1992-1996	0.840	0.721	0.554	0.462
1993-1997	0.928	0.831	0.461	0.472
1994-1998	0.912	0.787	0.565	0.532
1995-1999	0.692	0.610	0.547	0.448
1996-2000	0.717	0.680	0.456	0.450
1997-2001	0.798	0.767	0.535	0.578
1998-2002	0.838	0.773	0.534	0.560
1999-2003	0.838	0.688	0.393	0.399
2000-2004	0.847	0.710	0.565	0.526
2001-2005	0.825	0.862	0.750	0.702
Average	0.822	0.737	0.554	0.521
Panel B: Deposit rates				
1990-1994	0.807	0.680	0.620	0.635
1991-1995	0.866	0.706	0.386	0.476
1992-1996	0.866	0.746	0.418	0.456
1993-1997	0.881	0.806	0.343	0.490
1994-1998	0.784	0.706	0.437	0.435
1995-1999	0.735	0.599	0.474	0.385
1996-2000	0.919	0.744	0.442	0.710
1997-2001	0.955	0.847	0.399	0.465
1998-2002	0.946	0.867	0.459	0.563
1999-2003	0.901	0.746	0.350	0.386
2000-2004	0.874	0.736	0.484	0.457
2001-2005	0.863	0.798	0.632	0.606
Average	0.866	0.748	0.454	0.505
Panel C: Lending rates				
1990-1994	0.767	0.694	0.611	0.627
1991-1995	0.784	0.732	0.574	0.518
1992-1996	0.773	0.620	0.590	0.429
1993-1997	0.859	0.688	0.487	0.419
1994-1998	0.924	0.740	0.420	0.480
1995-1999	0.839	0.695	0.497	0.397
1996-2000	0.854	0.786	0.495	0.434
1997-2001	0.903	0.854	0.530	0.574
1998-2002	0.920	0.841	0.463	0.538
1999-2003	0.896	0.746	0.480	0.479
2000-2004	0.894	0.773	0.506	0.518
2001-2005	0.939	0.864	0.549	0.614
Average	0.863	0.753	0.517	0.502

Notes: The regional groups comprise the following countries: CMA = Lesotho, Namibia, South Africa, Swaziland; SACU = CMA plus Botswana; OTHER = Angola, DR Congo, Madagaska, Malawi, Mauritius, Mozambique, Seychelles, Tanzania, Zambia, Zimbabwe.

Table 4: Principal components analysis of convergence groups among SADC countries for 2000 to 2005

	Convergence groups						Convergence groups						Convergence groups					
	Full sample	Group 1	Group 2	Group 3	Group 4	Group 5	Full sample	Group 1	Group 2	Group 3	Group 4	Group 5	Full sample	Group 1	Group 2	Group 3	Group 4	Group 5
	Panel A: Bank rates						Panel B: Deposit rates						Panel C: Lending rates					
<i>Eigenvalue</i>																		
PC#1	7.357	5.532	1.604	na	na	na	7.727	4.81	1.506	1.516	na	na	7.999	6.683	1.685	1.691	na	na
PC#2	1.798	0.772	0.396	na	na	na	2.106	0.842	0.494	0.484	na	na	2.826	0.569	0.316	0.309	na	na
PC#3	1.152	na	na	na	na	na	1.316	0.664	na	na	na	na	1.028	0.352			na	na
PC#4	0.663	na	na	na	na	na	1.031	na	na	na	na	na	0.827				na	na
<i>Cumulative R²</i>																		
PC#1	0.613	0.791	0.802	na	na	na	0.552	0.687	0.753	0.758	na	na	0.571	0.835	0.842	0.846	na	na
PC#2	0.763	0.901	1.000	na	na	na	0.702	0.807	1	1	na	na	0.773	0.907	1.000	1.000	na	na
PC#3	0.859	na	na	na	na	na	0.796	0.902	na	na	na	na	0.847	0.951	na	na	na	na
PC#4	0.914	na	na	na	na	na	0.871	na	na	na	na	na	0.906	na	na	na	na	na
<i>Factor loading of vector 1</i>																		
Angola	-0.329	-0.358					-0.282					-0.282	-0.278	-0.312				
Botswana	-0.129			0.512			-0.237	-0.296					-0.112		0.707			
Lesotho	-0.205	-0.289					-0.263	-0.368					-0.349	-0.379				
Madagascar	0.219		0.707				0.201		0.707				-0.039			0.707		
Malawi	-0.303	-0.351					-0.284			0.707			-0.319	-0.352				
Mauritius							-0.246				-0.587		0.029				0.933	
Mozambique							-0.296			0.707			-0.156		0.707			
Namibia	-0.348	-0.413					-0.249	-0.375					-0.329	-0.364				
Seychelles	-0.351	-0.414					-0.341	-0.301					-0.328	-0.358				
South Africa	-0.344	-0.401					-0.254	-0.444					-0.335	-0.371				
Swaziland	-0.346	-0.403					-0.323	-0.443					-0.321	-0.351				
Tanzania	0.223		0.707				0.066		0.707				-0.203			0.707		
Zambia	-0.296			0.416			-0.336	-0.401					-0.312	-0.338				
Zimbabwe	0.272					-0.649	0.252					-0.455	0.301					0.301

Notes: na denotes not applicable. Bank rate was not available for DR Congo, Mauritius and Mozambique. Deposit and Lending rates were not available for DR Congo. For each of our three interest rates, we report the eigenvalues and cumulative R² for the full sample and the groups. Likewise, the factor loading of the first PC for the full sample and the groups are reported. For groups where a factor loading is reported without eigenvalue and cumulative R², such a factor loading is obtained from the other significant principal components of the full sample.

Table 5: Principal components analysis of convergence groups among SADC countries from 2000 to 2005

	Group 1	Group 2	Group 3
Angola	BL		D
Botswana	D	L	B
Lesotho	BDL		
Madagascar		BDL	
Malawi	BL	D	
Mauritius			DL
Mozambique		DL	
Namibia	BDL		
Seychelles	BDL		
South Africa	BDL		
Swaziland	BDL		
Tanzania		BDL	
Zambia	DL		B
Zimbabwe			BDL

Notes: B - Bank rate, D - Deposit rate and L - Lending rate; Group 2- Pair of countries move together and Group 3- Each country is independent.

Table 6: Regional patterns in the national pass-through in SADC banking markets

	Dependent variable: Multiplier for a +1% shock					
	Impact	1 month	3 months	6 months	12 months	long-run
Panel A: Deposit rates						
Intercept	0.21	0.25	0.32	0.36	0.40	0.42
	<i>2.17</i>	<i>2.42</i>	<i>3.02</i>	<i>3.39</i>	<i>3.57</i>	<i>3.66</i>
Regional dummies:						
CMA	0.20	0.21	0.19	0.15	0.12	0.10
	<i>3.23</i>	<i>3.22</i>	<i>2.80</i>	<i>2.25</i>	<i>1.73</i>	<i>1.36</i>
Botswana	-0.17	-0.08	0.00	0.07	0.12	0.15
	<i>-1.70</i>	<i>-0.72</i>	<i>0.03</i>	<i>0.62</i>	<i>1.02</i>	<i>1.19</i>
Time dummies	yes	yes	yes	yes	yes	yes
Adjusted R ²	0.06	0.03	0.02	0.02	0.02	0.03
Panel B: Lending rates						
Intercept	0.25	0.31	0.38	0.43	0.46	0.48
	<i>2.43</i>	<i>3.23</i>	<i>3.92</i>	<i>4.40</i>	<i>4.63</i>	<i>4.71</i>
Regional dummies:						
CMA	0.23	0.35	0.33	0.31	0.28	0.24
	<i>3.46</i>	<i>5.75</i>	<i>5.41</i>	<i>4.94</i>	<i>4.41</i>	<i>3.71</i>
Botswana	0.05	0.13	0.21	0.22	0.19	0.15
	<i>0.47</i>	<i>1.29</i>	<i>1.97</i>	<i>2.02</i>	<i>1.78</i>	<i>1.39</i>
Time dummies	yes	yes	yes	yes	yes	yes
Adjusted R ²	0.06	0.17	0.15	0.13	0.11	0.08

Notes: All independent variables are dummies. For each independent variable, the first row reports the estimated coefficient and the second row reports the *t*-statistics in italics. In Panels A and B, the regressions are based on samples of 143 and 147 observations, respectively. Multipliers for all SADC countries are included. Time dummies for the different rolling periods are included but results are not reported.

Table A-1: Summary of exchange rate systems and exchange control restrictions on capital account transactions in the SADC countries

Country	Exchange rate system	Restrictions on capital account transactions
Angola	Free floating exchange rate system.	Inward investment is prohibited in some strategic sectors as defense and security. Capital repatriation upon liquidation is subject to prior approval of the Minister of Finance. Annual transfers of dividends are subject to approval by BNA. All capital transfers are subject to licensing and control.
Botswana	The currency is pegged to a weighted basket of currencies comprising SDR currencies and the South African Rand.	Full capital account convertibility since February 1999.
DR Congo	Free floating system.	
Lesotho	Fixed exchange rate regime (Pegged at par with the South African Rand –CMA).	No restrictions on capital accounts within CMA. Limited reforms on capital account since June 27, 2003: - Foreign investment by private individuals outside the CMA up to M250,000.00. - Opening of foreign currency and offshore accounts for private individuals is limited to M250,000.00. - Direct investment by corporate / companies to countries outside the CMA is allowed up to M50 million within the SADC region and up to M30 million elsewhere. - No restriction on long-term capital inflows.
Madagascar	Independently floating (but IMF notes that the regime operating de facto in the country is different from its de jure regime).	
Malawi	Managed floating with no pre-determined path for the exchange rate.	
Mauritius	Managed floating with no preannounced path for exchange rate.	There are no restrictions on capital account transactions in respect of both inward and outward investments.
Mozambique	Free floating system.	Non-residents and traveler can import any amount of foreign currency against declaration. Only the foreign currency previously declared may be exported. Foreigners are allowed to invest in Mozambique. Expatriation of profits and invested capital are also allowed and regulated by the law.
Namibia	Fixed exchange rate system – pegged at par with the South African Rand.	No capital account restriction within CMA.No restriction on capital from non-residents for equity investment. Outward investments limit for corporate business is N\$750 million.
Seychelles	Conventional fixed peg arrangements against a single currency (but IMF notes that the regime operating de facto in the country is different from its de jure regime).	
South Africa	Free floating system.	No restrictions on inward investment and disinvestment by non-residents. There are controls on outward capital investment.
Swaziland	Fixed exchange rate system – pegged at par with the South African Rand.	Same as South Africa.
Tanzania	Managed floating exchange rate system.	The capital account is not fully liberalised.
Zambia	Fully market determined.	The are no exchange controls on capital account.
Zimbabwe	Foreign currency Auction System- since January 2004.	The are exchange controls on capital account.

Source: IMF Exchange Rate Arrangements and Restrictions, Annual Reports, various issues.