Fachhochschule Köln
Cologne University of Applied Sciences

Institute of Global Business
& Society.

GLOBUS WORKING PAPER NO. 2009-1

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

Meshach Jesse Aziakpono
Stefanie Kleimeier
Harald Sander

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

by

Dr. Meshach Aziakpono
Associate Professor of Economics, Department of Economics and Economic History, Rhodes University, P.O. Box 94, Grahamstown 6140, South Africa.

Dr. Stefanie Kleimeier*
Associate Professor of Finance, Limburg Institute of Financial Economics, Maastricht University, Tongersestraat 53, 6211 LM Maastricht, The Netherlands.

Prof. Dr. Harald Sander
Professor of Economics and International Economics, Faculty of Economics and Business Administration, University of Applied Sciences Cologne, Claudiusstr.1, 50678 Köln, Germany.

Abstract

This paper investigates the state, development and drivers of banking market integration in the member countries of the Southern African Development Community (SADC) by employing interest rate data. We first conduct a principal component analysis and find evidence for both increasing monetary integration and banking integration in loan and deposit markets. These integration processes are not developing uniformly and we can identify a convergence club. As banking market integration can be a genuine process or simply be driven by monetary integration, we also investigate the interest rate pass through from national and South African Central bank interest rates onto national retail rates. With respect to the convergence club we find both, genuine and monetary-integration driven processes though the latter dominate. We conclude that a selective expansion of the Common Monetary Area is possible but needs to be complement by efficient financial development policies.

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

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

* Corresponding author. Mailing address: Limburg Institute of Financial Economics, FdEWB, Maastricht University, P.O. Box 616, 6200 MD Maastricht, The Netherlands. Email: s.kleimeier@finance.unimaas.nl. Phone: +31-43-3883733. Fax: +31-43-3884875.

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 initiatives[1] is the Southern African Development Community (SADC). SADC 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, Democratic Republic of Congo (DRC), 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 (OCA) considerations or macro-economic (nominal) convergence (see Jenkins and Thomas, 1998; McCarthy, 2002; Khamfula and Huizinga, 2004; Kabundi and Loots, 2007; Rossouw 2006). In contrast and as a complement to these exercises our study concentrates on the state and potential development of monetary and financial integration across SADC countries. In choosing this point of view we also implicitly acknowledge the new strand of literature on endogenous OCAs which start with Rose (2001) and hypothesize a potentially large positive effect of a common currency on trade. We investigate rigorously 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 (PT) analysis, with a view on deriving policy conclusions on the readiness of countries for joining a monetary area or union based on monetary and financial integration criteria.

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

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 (M&As). As such data are either notoriously unreliable or unavailable for SADC countries, price-based measures, in our case interest rates, are preferable. Price-based measures of integration regularly use the law of one price (LOOP) as the point of reference (Adam *et al.*, 2002) and thus investigate price convergence. In the case of financial integration, the relevant parity conditions are interest rate parity conditions. A LOOP-based point of view is acceptable when analyzing homogeneous assets but is questionable for heterogeneous assets that characterize retail banking markets. In the European context Kleimeier and Sander (2000) therefore advocate to investigate co-movements rather than convergence of retail interest rates. While in a structurally stable environment this can be done by means of cointegration analysis, for SADC countries it is more appropriate to analyze co-movements of interest rates without expecting to find stable long-term relationships. In order to investigate monetary and banking market integration in SADC, we therefore apply PCA to central bank (monetary policy) interest rates, deposit and loan interest rates, respectively. The PCA allows us to identify sub-groups of countries for which interest rates move in the same direction. More specifically, we consider a (sub-) group of countries to be integrated when their interest rates are driven by one common principal component. When interpreting the results of the PCA, the special role of the central bank in the banking market must be considered. Here, the European experience has made clear that in the presence of integrated money market rates or monetary policy rates, co-movements of retail interest rates can easily be misread as sign of an integrated banking market (Kleimeier and Sander, 2007). If central bank rates move together and monetary policy rates are transmitted to retail rates in a uniform way in the various countries, then the banking market *appears* integrated. Therefore an analysis of the national interest rate PT should complement PCA. This news-based measure thus reports

how similar the banking markets in the investigated countries respond to monetary policy news.

In this study we contribute to the literature by focusing on the state of and potential for financial integration in SADC with special reference to banking market integration. The existing empirical evidence focuses either on measuring integration or on measuring the PT, but no study has brought both elements together. This is where our contribution lies. First, we investigate monetary and banking market integration using PCA. By applying PCA to different time periods, i.e. rolling time windows, we document the progress and development of financial integration over time. Second, we look at the driving forces of banking market integration and single out the role of an efficient PT of national monetary policy onto bank interest rates or – if applicable – the role of a common or dominant monetary policy. The latter is explored by investigating directly the PT from South African to domestic banking rates. Our findings indicate that the degree of financial integration is increasing in some but not all countries. While banking market integration is predominantly driven by monetary integration, a genuine banking market integration process is also observable in some countries. However, even this integration process is concentrated on a "convergence club" with CMA in its centre. Our analysis indicates that a few non-CMA SADC countries may become potential candidates for a CMA enlargement, while many others are still far away from being judged as candidates from a pure financial integration point of view.

The plan of the paper is as follows: Section 2 reviews the state of banking market integration in Southern Africa as it is documented in the literature. Section 3 describes data and methodologies used. Section 4 reports the results and Section 5 concludes.

2. Financial Development and Integration in SADC: Stylized facts and literature review

SADC comprises 15 countries[2] which differ widely in terms of development, macroeconomic stability, monetary and financial development and real and financial integration. Of these countries four are currently member of the CMA and are thus operating under a fixed exchange rate systems with the South African rand as anchor currency. Botswana, that together with the four CMA countries forms the Southern African Customs Union (SACU), has an independent exchange rate system but is indirectly linked to the rand through a currency basket in which the rand accounts for 60 to 70%. The other 10 countries (OTHER) are following largely differing exchange rate regimes.[3] Table 1 give an overview of the development of some important real and financial development indicators of the individual SADC countries as well as the GDP-weighted averages for all SADC countries and the subgroups CMA, SACU and OTHER. As expected, CMA shows the highest degree of macroeconomic convergence, especially with respect to inflation. Botswana's characteristics are in a similar range but the diversity is much higher in the OTHER countries. Comparing SADC's achievements with respect to the Maastricht criteria for convergence and thus membership in the European Monetary Union (EMU), Rossouw (2006) argues that "the challenges facing a SADC monetary union would not be insurmountable if the convergence criteria are viewed as permanent goals, rather than preconditions." In contrast, Khamfula and Huizinga (2004) and Buigut and Valev (2006) are less optimistic. While the former conclude that "a monetary union that embraces all SADC members would amass large costs relative to the benefits and hence would not be desirable", the latter point to South Africa's resistance to a CMA expansion and conclude that the CMA could easiest be expanded by Botswana, Mozambique and Zambia.

[Insert Table 1 about here]

[2] Seychelles was a member of SADC from 1997 to 2004, when it pulled out of the arrangement, but has since then started negotiations to rejoin. Hence in the analysis it is treated as a SADC member.

[3] For a summary of exchange rate systems, exchange control restrictions on current and capital account transactions in SADC countries, see Table A-1 in the appendix.

Looking at financial development reflected by the spread of lending over deposit rates as an indicator of banking market efficiency and financial deepening indicators such as credit to GDP and deposits to GDP clearly shows the enormous diversity in financial development as well as the well-documented financial underdevelopment in many SADC countries. Clearly, South Africa and Namibia have the most developed banking markets along with non-CMA member Mauritius. Moreover these measures improve slightly over time. Financial development is also taking place in the remaining countries but is still at a very low level. Not much progress is being made in the latter group with respect to the spreads. To the contrary, this efficiency measure shows improvement in only very few countries and is still particularly high in the OTHER countries.

Given the strong differences in financial intermediation, bank interest rates and spreads several questions arise when capital movements are not (fully) restricted[4]: Are arbitrage processes taking place across SADC banking markets? To what extent are these processes already effective in integrating SADC banking markets? If retail banking rate are in fact co-moving, to what extent is this being mediated through co-movements of monetary policy-determined interest rates?

The existing empirical studies on interest rates in Southern Africa focus either on measuring integration by interest rate co-movement (Aziakpono, 2006 and 2008; Nielsen *et al.*, 2005) or on measuring the PT (Sander and Kleimeier, 2006). Aziakpono (2008) and Nielsen *et al.* (2005) investigate the behaviour of national interest rates by using the interest rate parity as an indicator of integration. Aziakpono's (2008) findings reveal a high level of dependence of the other SACU countries' financial systems on South Africa's and he thus concludes that a monetary unification with a single central bank (South African Reserve Bank) and monetary policy for the union is feasible. However, the success of such a monetary union will critically depend on the efficiency gains of the domestic financial system. Such gains are country-specific. For countries such as Botswana, Lesotho and

[4] For country details on restrictions on capital account transaction see Table A-1 in the appendix.

Swaziland with relatively weak domestic monetary policy transmission, a significant improvement in their monetary transmission can be expected. However, in Namibia, where the domestic policy seems to be more effective, a single central bank may actually lower the speed of the monetary transmission process. These findings are in line with Nielsen *et al.* (2005) who use the uncovered interest rate parity to assess the level of financial integration within the CMA plus Botswana, Zambia and Zimbabwe. Using both rolling unit root tests and a moving regression that enable them to examine the degree of financial integration over time, they find that Lesotho, Namibia and Swaziland are well financially integrated with South African market while the other countries are not. Regarding South Africa's special role Aziakpono (2006) formulates and tests the South African dominance hypothesis (SADH) and the possibility of arbitrage activities within the SACU countries using interest rates PT. The SADH relates to the extent to which monetary policy stance in South Africa is passed through to and reflected in the monetary policy of the other countries while interest rate parity arising from profit-seeking capital flows is regarded as evidences of arbitrage activities. His findings support the SADH and reveal a hierarchy of financial integration with South Africa ranging from highly-integrated Namibia and Swaziland to less-integrated Lesotho and least-integrated Botswana. The results further suggest policy convergence, rather than market convergence (arbitrage activities), as the main driver of integration. In a related study, Sander and Kleimeier (2006) find a rather homogeneous PT process for lending rates and a less homogeneous one for deposit rates. Again South African interest rates play an important role in the determination of national discount rates, T-bill rates as well as commercial bank interest rates. They thus confirm the finding of Aziakpono (2006) and the validity of the SADH. While existing studies focus on the CMA or SACU countries, with exception of Nielsen *et al.* (2005) who included Zambia and Zimbabwe, none of them has investigated the extent of integration and the SADH across the entire set of SADC countries. As such, our study is also the first to provide directly comparable evidence for all SADC countries.

3. Data and Methodology

3.1. Data

We investigate the integration of central bank and retail banking markets by analyzing the interest rates that are charged in these markets. We therefore 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 extends from January 1990 to December 2005 but several series have missing values.[5]

As the economic environment in Southern Africa is rather volatile, we have to define an appropriate time horizon for our analysis. On the one hand, a shorter sample period will better reflect changes that occur in the banking markets. On the other hand, a longer sample period will provide statistically sounder results. To balance these two aspects, we opt for rolling sample periods of five years (60 observations) each. We can thus analyze 12 samples from January 1990 to December 1994, January 1991 to December 1995, and so on until January 2001 to December 2005. While sufficiently long for statistical analyses, the rolling nature of the sample periods should reveal any changes in integration over time.

Figure 1 gives a first impression of the development of interest rate dispersion over time in four regions of CMA, SACU, SADC and our final group of OTHER countries which includes all SADC countries that are not SACU members. The coefficient of variation – defined as the standard deviation of all regional interest rates divided by their mean – reveals that interest rates are more homogenous in CMA and SACU. Due to the exchange rate union among CMA countries and – to lesser extent – to Botswana, this result is not surprising. Taking the region as a whole, the degree of dispersion starts to increase in late 2003. While this increase occurs simultaneously for retail rates and central bank rates in the non-SACU countries, lending rate dispersion does not increase in the CMA.

[Insert Figure 1 about here]

[5] Details are available in Table A-2 in the working paper version of this study.

3.2. Methodology

The developments of interest rate dispersion in SADC countries suggest two avenues for subsequent investigation. First, we will scrutinize the development and extent of integration of both central bank and retail interest rates by means of a PCA. As Figure 1 clearly illustrates, the integration (or disintegration) process of retail banking can be dominated by monetary integration as it could be inferred from the recent developments of the non-SACU OTHER countries. Looking however at CMA and – to a much lesser extent at SACU – banking markets may also lead the process. Thus, and secondly, we will investigate the driving forces of banking market integration. If monetary integration is the driver, then it requires that in the process of monetary integration the PT from central bank rates to retail interest rates will not become more heterogeneous. If the PT remains unchanged, the developments in banking markets are simply following monetary integration. If the PT becomes more homogeneous under increasing monetary integration – or more heterogeneous under monetary disintegration – this would reflect more banking market integration. The latter can happen particularly in times where banking interest rates follow the national central bank rates to a lesser degree than before and instead orient themselves more to central bank rates of a dominant foreign monetary policy. Thus we conduct a PT analysis in order to reveal the driving forces of banking market integration, particularly the role of an efficient PT of national monetary policy onto bank interest rates and the role of a common or dominant monetary policy. With respect to SADH this means that when the South African Reserve Bank has a direct and unidirectional impact on monetary policy rates in other country and an efficient PT exists in South Africa and the respective other country, then the banking markets also appear to be integrated by means of *monetary policy convergence* rather than a genuine *banking market convergence* which could also be dominated by South African markets. A third version of the SADH could envisage a direct impact of South African monetary policy rates on bank interest rates in third countries even without monetary integration when banks orient their pricing policy to South African policy rates.

3.2.1. Principal component analysis

PCA has it roots in the analyses of financial integration based on interest rate levels. These generally follow one of two approaches. The first was introduced by Cooper (1971) who examines the degree of divergence of interest rates across countries based on their standard deviation. According to this approach, the lower the standard deviation of yields on similar assets the higher the degree of financial integration; whereas if the standard deviation is high, then the level of integration is low (Nellis, 1982). The second approach popularized by Logue *et al.* (1976) focuses on the covariability of interest rates and does not require similarity of interest rate levels. Here, the degree of financial integration will be high if the covariability of interest rates and their changes is high despite the fact that interest rate levels may differ substantially. As Figure 1 shows, this is the case for SADC countries and we thus follow this second approach and assess the covariability of interest rates using PCA.[6]

The aim of PCA is to obtain a small number of uncorrelated factors, called principal components (PCs) that best account for the correlation among the interest rates in the different countries. Let X represents a vector of interest rates in the CMA countries. PCA detects banking market integration by converting a matrix of these rates into a linear combination of unobserved PCs, which explain the complete variance of these interest rates. The PC problem can thus be expressed as

$$P = AX \quad (1)$$

where P is a vector of orthogonal factors or PCs which are a linear combination of the original interest rate series X. X describes the *m* observed sets of interest rates variables and A is a matrix of coefficients, called factor loadings, with each coefficient representing the weight of the corresponding original variable in the relevant PC. The number of PCs is equal to the number of the original variables. However, the PCs are orthogonal, i.e. independent of each other. The PCA derives the PCs in such a way that they explain the variations in the set of original variables in a descending order. Thus, the first PC accounts for the main part of

[6] Next to the contribution to the understanding of Southern African banking markets, our study is thus also contributing to the growing literature which assesses regional integration based on PCA

the variation in X; the second PC will explain the main part of the remaining variations in X after the effects of the first PC has been removed.[7] If banking markets are integrated, the correlation structure of the interest rates would be best described by one common factor explaining their long run behaviour. But if banking markets are not integrated, there will be more than one PC needed to explain the interrelations between bank interest rates.

In order to determine the explanatory power of each PC, two measures are conventionally used: eigenvalue and cumulative R^2. To determine the significance of a PC we apply the Kaiser rule of eigenvalue greater or equal to 1 (Kaiser, 1960).[8] Next, to determine the relative contribution of each country's interest rate to the significant PCs, we used the factor loadings of the PCs. Note that the signs of the loadings are completely arbitrary (Jolliffe, 2002:67). However, the pattern of variation of the signs from one factor loading to the other can be used to determine the co-movement of the variables. In the context of our analysis, a largely random factor loading (with differing signs and sizes) implies that the interest rates move largely independently of each other, hence indicating low integration. The more systematic (same sign and size) the loadings, the greater the degree of integration (Becker and Hall, 2008). In addition, the pattern exhibited by a group of countries can be used to determine a convergence group, i.e. countries that move in the same direction (having the same sign in the same PC). Even though PCA is a static analysis, in this paper, following Gilmore *et al.* (2008), we tailored it to a dynamic analysis to examine the progress and development of banking market integration over time. This is accomplished by estimating the models for rolling time windows of five years each and then graphically plotting the eigenvalues.

(Perignon *et al.*, 2007; Becker and Hall, 2008; Gilmore *et al.*, 2008; Figueira *et al.*, 2005; Siliverstovs *et al.*, 2005; Fernandez-Izquierdo and Lafuente, 2004; Nellis, 1982).

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

[8] For a discussion of weaknesses and alternative rules see Jolliffe (2002:112-131). For applications see for instance Nellis (1982), Figueira *et al.* (2005) and Meric *et al.* (2008).

3.2.2. Empirical pass-through analysis

The PT methodology is closely based on Sander and Kleimeier (2004, 2006) who model the PT as the following vector autoregressive (VAR) process:

$$RR_t = \beta_0 + \sum_{i=1}^{k^*} \beta_{RR,i} RR_{t-i} + \beta_1 CBR_t + \sum_{i=1}^{n^*} \beta_{CBR,i} CBR_{t-i} + \varepsilon_t \quad (2)$$

where CBR_t is the central bank 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 RRs to CBRs 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 equation (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.

As is common for interest rate time series, the CBRs and RRs used in this study exhibit an I(1) property – that is, they are non-stationary series that do not return to any mean value and that have with time increasing variances.[9] In this case, PT models like

[9] 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

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

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

It should be noted that by doing so, important information about the long-run relationship is lost. Equation (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).[10] The deviation from the long-run equilibrium will then be measured by the estimated error u_t from equation (4) and included in the PT model as a lagged error correction term (ECT). Thus, a proper PT measurement should be based on an error correction model (ECM) that explicitly incorporates the long-run relationship between RRs and CBRs provided the series are cointegrated:

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

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 banking 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. 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. For CMA

---

or not the interest rate series used in this study are non-stationary. For each of the rolling sample periods, 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 structural break (see Banerjee, Lumsdaine, and Stock, 1992). Results can be found in working paper version of this 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 CBR and the RR are I(0), we always estimate the PT in first differences.

[10] We employ two types of tests in order to determine whether on not CBR and RR 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 1 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 equation (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

countries we thus expect β_1 and θ in a model with South African CBRs to be non- zero and possibly larger than in a model with national CBRs. Imagine, however, that banking markets are fully integrated in the absence of monetary integration while capital mobility is given only in retail banking. Consider under such conditions an increase in the South African central bank rate that also increases deposit rates. With an integrated banking market this would lead to cross-border arbitrage and eventually to higher deposit rates in the other countries. This effect manifests itself in our PT model when for a non-CMA country β_1 and θ are relatively large in response to South African CBRs and relatively small in response to national CBRs. Hence, the existence of a PT from the South African policy rate to other countries' national banking market rates can be interpreted as evidence for banking market integration when no monetary integration is found. Thus, the PT analysis is an important complement to the PCA.

4. Results

4.1. Banking market integration: Evidence from principal component analyses

Tables 2 and 3 as well as Figure 2 summarize the PCA results.[11] Table 2 reports the cumulative R^2 of the first PC, while Figure 2 and plots the eigenvalues of the PCs of the first PC. The results are reported by regional group as well as by interest rate. Table 3 reports the summary results of the convergence group analysis based on the factor loadings of significant PCs for the period 2000 to 2005 when there was greater evidence of banking integration in the SADC region. Overall, the results confirm our expectation that CMA banking markets are the most integrated followed by the SACU countries. With the exception of deposit markets, the OTHER countries are more integrated than SADC as a whole. There is also some evidence to suggest that the level of integration increases over time for each region and interest rate.

our overlapping sample periods, exceptions are made for single periods. Details can be found in working paper version of this paper.

[11] Additional results of the PCA can be found in Figure 3 and Table 2 in the working paper version.

[Insert Table 2 about here]

4.1.1. CMA

In the CMA with the exception of 1996-2000 rolling period for the central bank rate, in all the rolling windows there is only one significant PC. The cumulative R^2 reported in Table 2 also confirm this. In all the cases, the first PC has a high explanatory power, explaining on average 82%, 87% and 86% of the variations in central bank, deposit and lending rates, respectively. Both retail rates exhibit stronger evidence of convergence and integration than the central bank rate. As evident from the graphical plot of the eigenvalues of the first PC in Figure 2 and the R^2 in Table 2, the level of banking market integration among the CMA countries is relatively stable over time, only the R^2 show some improvement except for the second half of the 1990s (1995-1999 and 1996-2000 rolling periods). The possible reasons for the slight drop in the degree of banking market integration during the 2nd half of the 1990s become apparent if one examines the factor loading for the CMA[12]. The factor loading of the first PC show that all countries move in the same direction as can be expected due to the CMA agreement. However, the coefficients for Lesotho are lower, implying that this country weighs less in the integration of the region. This effect is particularly manifest in the central bank rate, which in addition to being significantly lower, actually moves in the opposite direction during 1996-2000 rolling period. However, the trend changes with the 1997-2001 rolling period. The events in Lesotho lend support to the results. From the mid-1990s, the financial system in Lesotho experienced considerable distress which was mainly due to poor management, irresponsible lending and political interference in banking operations. This culminated in the liquidation of the Lesotho Agricultural Development Bank (the country's second largest bank) in 2000 and the Lesotho Bank (the country's largest bank) in 2001, despite several rescue attempts by the government. In August and September 1998, Lesotho was furthermore engulfed in a political crisis that led to destruction of property, heavy stock looting and burning of several

[12] See Figure 3 in the working paper version for results of the factor loading.

companies. The uncertainty created by the crisis resulted in an additional decline in domestic banking activities (Aziakpono, 2004).

[Insert Figure 2 about here]

4.1.2. SACU

As expected, the banking markets in the SACU countries are also highly integrated though to a lesser extent than the CMA countries. In most rolling periods, one significant PC is found. The explanatory powers of these first PCs are quite high, averaging 73.7%, 74.8% and 75.3% for central bank, deposit and lending rates, respectively. Again, the retail bank rates show stronger evidence of convergence. The level of banking market integration however varies slightly over time. Similar to the CMA countries, SACU's banking markets experience the least integration during the second half of the 1990s, especially during 1995-1999. During 1997-2001 and 1998-2002, banking markets and here especially the retail markets experienced an unprecedented level of integration but dropped again during 1999-2003, and thereafter begin to rise.

An examination of the coefficients of the first PC reveals the relative contributions of each country's market to the observed integration patterns. The pattern of movement of the CMA countries within SACU remains the same as observed when analyzing the CMA region alone. However, Botswana moves in a consistent manner in all the periods and independently of the rest of the SACU countries for most of the rolling periods and irrespective of the interest rates used. It is striking that for all the instances where the markets moved in harmony (2000-2004 and 2001-2005 for all interest rates and 1994-1998 for lending rates), the CMA countries converge towards Botswana and not the opposite. It is not quite evident what is responsible for the pattern during the 1994-1998 rolling period. One possible explanation might be the change in the political dispensation in South Africa in 1994 resulting in a friendlier relationship with Botswana, which hitherto maintained a strong opposition to South Africa. The concomitant relaxation of the political tension between the two countries might have manifested itself in the synchronization of their banking credit markets.

The pattern since 2000 can be explained by two possible factors. First, in February 1999 Botswana adopted a more liberal foreign exchange policy by abolishing the exchange control and adopting full capital account convertibility.[13] This policy action which signalled a move towards openness of the financial system might have contributed to the synchronization of interest rates. However, given the fact that the factor loadings for Botswana for all the interest rates maintain a consistent pattern over time, the change in policy stance in 1999 may not have been the major driver of the synchronization of interest rates with those of the CMA countries. Hence, in our view, a second factor may be the major driver: In 2000, South Africa adopted an inflation targeting monetary policy framework which resulted in a drop in both inflation rate and market interest rates (and of course the other CMA countries followed). Importantly, this brought stability to the market interest rates relative to the past, resulting in rates which were more in harmony with Botswana's stable and lower interest rates.

4.1.3. OTHER and SADC

The none-SACU members of the SADC constitute the OTHER region. As expected the level of banking market integration is relatively low compared to SACU. However, unlike CMA and SACU where the retail bank rates lead the integration process, in OTHER countries the central bank rates lead the integration process followed by lending rates. With an average of 55.4%, 45.4% and 51.7% for central bank, deposit and lending rates, respectively, the explanatory power of the first PC is low. Likewise, there are mostly two or more significant PCs. It is also evident that the degree of banking market integration increases during the last two rolling periods for all interest rates. The factor loadings are very random except in the last two rolling periods when they tend to exhibit a more systematic pattern. Finally, the results for the entire SADC region are quite similar to OTHER. It is also evident that in recent years, particularly since 2000, the degree of banking market integration increases.

[13] See Table A-1 in the appendix for a summary of the prevailing exchange rate systems.

4.1.4. Convergence Club in the SADC region: 2000 - 2005

We subject the entire SADC region to further analysis focusing on the period between 2000 and 2005 where there is evidence of growing integration. Our aim is to sort the countries into groups that are becoming integrated based on the similarities of their movements. Since our earlier analyses show that the CMA countries are highly integrated we will pay attention to those countries of the SADC that are converging to the CMA countries which can together form part of an expanded CMA. Hence, the analysis will shed light on the prospect for a SADC-wide monetary union. If the banking markets in most countries are already converging to the CMA countries, the prospect of monetary union is high, otherwise much work will still need to be done. The estimation is carried out for each of the three interest rates but we retain only the significant PCs for analysis. Countries with high factor loadings and with the same sign in the same PC are regarded as moving together and are thus grouped together. Following an iterative approach suggested by Jolliffe (2002), we subject such a group to further analysis. If the countries in the group are truly integrated, a further PCA should produce only one significant PC. If not, the process continues until we obtain a single dominant PC that explains most of the variation in the interest rates. The results are reported in detail in Table 3. For each of our three interest rates, we report the eigenvalues and cumulative R^2 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 R^2, such a factor loading is obtained from the other significant PCs of the full sample.

The results for the central bank rates of 12 countries are shown in Panel A of Table 3. The eigenvalues reveal that there are three significant PCs explaining about 86% of the variation in central bank rates, while the first PC (PC#1) alone explains 61%. Looking at the factor loadings of PC#1 in the full sample, one can easily identify seven countries with high coefficients and equal signs. These seven countries constitute Group 1. Further estimation produces only one significant PC, which explains 79% of the variations in the central bank rates. Though Zambia appears to have a high coefficient with the same sign as the other

seven countries in PC#1, its coefficient also dominates the third PC (PC#3) of the full sample. In addition, when Zambia's central bank rate is included in Group 1, two significant PCs are found. Hence, Zambia is excluded from Group 1. Though the factor loading for Botswana in PC#1 moves in the same direction as those of the countries in group 1, its coefficient dominates the second PC. When adding Botswana's central bank rate to Group 1, two significant PCs are found. Hence, Botswana is removed from Group 1. In the subsequent PCA, though factor loadings for Botswana are highest, the factor loadings for Madagascar and Tanzania are equally high, but both move in the opposite direction compared to Botswana. The three countries' central bank rates are estimated, but the results produced two significant PCs, with one dominated by Botswana and the other by Madagascar and Tanzania. Hence, it is apparent that Botswana is not in same group as the other two countries. Estimation for the two countries results in one significant PC explaining 80% of the variations in rates. An outlier is Zimbabwe whose factor loading dominates the fourth PC of the full sample. Overall with regards to the central bank rates, we can identify five groups of countries that tend to move in different directions. The dominant group, Group 1 comprises the CMA countries plus Angola, Malawi and Seychelles. Group 2 comprises Madagascar and Tanzania, while the other three countries, Botswana, Zambia and Zimbabwe, are largely independent.

[Insert Table 3 about here]

In the case of deposit rates reported in Panel B, the results show that there are four significant PCs for the 14 countries in the sample. Following the same procedure as for central bank rates, we identify five groups of countries moving in different directions. In Group 1 there are seven countries, including the SACU members plus Seychelles and Zambia. Angola seems to move closely with Group 1 as it does not have a high factor loading outside the first PC. However, when Angola is included in Group 1, two significant PCs are found. Group 2 comprises Madagascar and Tanzania with the first PC explaining 75% of the variations in their deposit rates. Group 3 includes Malawi and Mozambique. The factor loadings for Mauritius and Zimbabwe dominate the fourth PC of the full sample and

they appear to move together. However, the results of their combined group indicate almost two significant PCs with the second PC explaining 41% of the variations in their deposit rates. A plot of their interest rate series also does not show any meaningful co-movement. As noted by Jolliffe (2002), it is unwise to group such countries together and we therefore treat Malawi and Mozambique as independent.

The results of the PCA for lending rates for 14 countries are reported in Panel C. The PCA detects three significant PCs accounting for 85% of the variations in the lending rates. The iterative analysis suggests also five groups of countries that move differently. The first group comprises of eight countries, which are the CMA members and Angola, Malawi, Seychelles and Zambia. In group 2 we have Botswana, and Mozambique, while group 3 comprises of Madagascar and Tanzania. Lastly, Mauritius and Zimbabwe are individually independent.

In summary, the convergence-group analyses suggest that some countries are showing signs of convergence with the CMA countries towards the end of our sample period (see Table 4). Prominent among them is Seychelles which converges in all three markets. Angola, Malawi and Zambia show convergence in two out of the three markets. In Botswana, convergence only occurs in the retail deposit market. A number of countries such as Madagascar, Mozambique and Tanzania seem to be moving together in pairs, but not with the CMA countries. Lastly, a few countries behave independently of the others. Notable among them are Zimbabwe and Mauritius. The central bank rates in Botswana and Zambia also behave in that fashion.

[Insert Table 4 about here]

4.2. Driving forces of integration: Evidence from pass-through analysis

An efficient and homogeneous PT from central bank rates onto retail banking rates can create the equivalent of an integrated banking market under the condition of a monetary integration that has already tied together policy-determined interest rates. Monetary integration is, however, neither sufficient nor necessary for banking market integration. It is not sufficient if the PT remains heterogeneous across countries because of special national

characteristics of the banking systems and a lack of cross-border arbitrage. On the other hand, monetary integration may not be necessary for banking market integration as it has become clear from the previous PCA for the convergence club during 2000-2005. In some cases, banking markets in fact lead rather than lag integration. In these cases an indirect PT from foreign central bank rates to national retail rates may exist via the foreign retail rates. Next to the national PT we therefore also investigate the PT from South African central bank rates to national retail rates.

We conduct rolling PT analysis for all SADC countries from 1990 to 2005 using the same five-year windows as for the PCA. Figure 3 summarizes our findings for the national PT by showing the average long-run multipliers and their variation in SADC and the sub-regions.[14] Our results show that the PT onto deposit rates is generally less than perfect with the long-run multiplier dropping substantially below the full PT value of 1 to a level below 0.6. Remarkably, this is not a single phenomenon in some groups but happens in all subgroups of the SADC countries. Consequently, the coefficient of variation remains rather stable over the investigated period, suggesting that the PT-heterogeneity within both SADC and the subgroups does not change much over time. The only exemptions are the OTHER countries. Here we find episodes of increased heterogeneity in the mid-1990s and early 2000s, suggesting a sensitivity of the PT to changes in the macroeconomic and regulatory environment. With respect to the short-run multiplier or the "speed" of the PT (not shown in Figure 3) it is interesting to note that these long-run values of the average multipliers are almost reached after three months. However, the 3-months multipliers show a slightly higher variability across countries. The reduction in the PT, in an advanced economy regularly interpreted as a signal of market imperfections, is in the SADC context predominantly linked to financial deregulation with respect to interest rates. In fact, by European standards a long-term PT of 0.6 for deposit rates is quite high. But it should also be noted that high inflation (at least above a certain threshold) typically leads to a high PT. With respect to loan rates we also find (partly for similar reasons) a reduction in the long-run average PT below the full

PT-benchmark of 1. Here, however, we clearly document a strong difference between CMA and SACU on the one hand, and the OTHER countries on the other hand. The former groups exhibit a still strong PT with South Africa often having a full PT, while in the latter group the PT is rather limited with an average long-run multiplier of close to 0.4 which may indicate serious banking market imperfections. Consequently, CMA and SACU have a much more homogenous PT than the others, although the heterogeneity increased somewhat during the later periods across all SADC countries.

[Insert Figure 3 about here]

In order to test for PT-differences between CMA, SACU and OTHER we adopt a simple dummy regression approach. We regress the multipliers of different time horizons on a CMA and a Botswana dummy and use additional time dummies for the rolling time periods (with the rolling period 2001-2005 as benchmark). These regressions are reported in Table 5 and reveal that the lending rate PT is significantly faster (between 0.24 and 0.35 points) and more complete (plus 0.24) in the CMA countries than in the OTHER countries. In Botswana the PT is only faster (up to 0.22 points) but not more complete. Moreover, the impression of a more efficient PT in the second half of the 1990s that can be interfered from Figure 3 is confirmed by the regression. With respect to deposit rates the PT in the CMA is speedier but not more complete. No significant effects are found for Botswana – at least at a 5% confidence level or higher.

[Insert Table 5 about here]

To highlight the drivers of banking market integration we concentrate in the following on the PT of those countries identified by the PCA in Table 4 as Group 1. As expected, all four CMA members belong to this convergence group and exhibit not only a fast but also (almost) perfect PT in lending rates. This PT is furthermore heavily influenced by South African central bank rates. We therefore conduct an additional PT analysis with respect to South Africa rates. The long-run multipliers for Group 1 are shown in Figure 4.[15]

[14] For specific national multipliers see Table A-3 in the working paper version.
[15] For specific national multipliers see Table A-4 in the working paper version.

The long run PT in the most recent period of investigation in Namibia is 0.8 for the national policy rate and 0.72 for the South African policy rate. In Swaziland, the values are 0.93 and 0.86, respectively, while lending rates in Lesotho are directly and exclusively responding to South African rates, possibly a consequence of the financial distress in this country described earlier. With respect to deposit rates the situation is similar. The highest long-term PT is found in South Africa (0.86). In the other CMA countries the PT from national rates is only marginally faster than the PT from South African policy rates (Namibia: 0.43 versus 0.38, Swaziland 0.74 versus 0.74, and Lesotho is again mainly responding to the South African rate with a PT coefficient of 0.24). In sum, it appears that banking market integration is following monetary integration. Thus, South African monetary policy plays a dominant role in banking market behaviour.[16] The PT evidence is therefore fully in line with the PC evidence that groups all CMA countries into one convergence group for all three interest rates. The PT also finds more evidence for integration in lending rather than deposit markets, particularly for Namibia. This finding is again in line with the PC results which found least convergence in deposits.

At the other extreme we have Botswana and Zambia who also belong to Group 1 but appear to be driven by banking market integration only. This process can be completely mediated through banking market arbitrage and is as such been detect by the PCA. Potentially, capital account convertibility in both countries drives these developments. Given the fast and (almost) complete PT in South Africa, the national banking rates should then also exhibit a statistical relationship with South African policy rates. In fact, Zambia's deposit and lending rates are increasingly related to South African central bank rates as is Botswana's deposit rate, though at a very low level.

In the remaining countries of the convergence Group 1 we find both monetary and (some) banking market integration. The Seychelles are the only non-CMA member of the Group 1 convergence club with respect to all three interest rates. As such, both an efficient

[16] These findings for CMA countries are also robust when allowing for asymmetric and threshold adjustment of retail rates as reported by Sander and Kleimeier (2006).

national PT as well as a link to South African rates may be important. In fact, the Seychelles' lending rate is responding to the national central bank rate, as can be seen from a (small) long-run multiplier of 0.54 in the most recent rolling period, but is also cointegrated with the South African policy rate with a most recent long-run multiplier of 0.19. The long-run responses of the deposit rate to national and South African policy rates are in a similar range with multiplier values of 0.57 and 0.19, respectively. Angola and Malawi are in Group 1 with respect to central bank rate and lending rates. In fact, we find their lending rates to be cointegrated with the South African policy rate while deposit rates are not consistently cointegrated over time. The (too) high multipliers are however difficult to interpret and may reflect the fact that national policy rates that still largely diverge from the South African ones.

[Insert Figure 4 about here]

In sum, banking market integration can be both a genuine process and/or driven by monetary integration. However, especially banking-market driven integration needs capital account convertibility. This is not needed with monetary integration in conjunction with an efficient and homogenous PT. Moreover, the latter approach has shown its ability to improve the efficiency of national banking markets in terms of a faster and more complete PT. From a policy perspective, however, a strong competition policy is needed whenever cross-border banking is limited, be it for regulatory or economic reasons.

5. Integration and monetary policy efficiency: Policy implications for an expansion of CMA

The PCA allows us to identify a convergence club within SADC. A first group within this convergence club consists of the CMA countries. They exhibit monetary integration and banking integration in loan and deposit markets. Clearly, here the monetary policy rates are dominated by South Africa. Moreover, as the PT is quite efficient in these countries, banking rates are also integrated. Consequently, the lending and deposit rates respond in a very similar way to changes in both, the domestic and the South African central bank rate. For example, the long run multiplier for loans in Namibia with respect to the

domestic policy rate is 0.80 and with respect to the South African rate it is 0.72. The corresponding responses in Swaziland are 0.93 and 0.86, respectively. The respective long-run multipliers for deposits in Namibia are 0.43 and 0.38, and 0.74 with respect to both policy rates in Swaziland.

A second group comprises non CMA-countries with monetary and banking integration in loan and deposit markets. Again the banking market integration appears to be mediated through the South African monetary policy rate as we find the Seychelles' deposit and lending rates to be cointegrated with the South African monetary policy rate. However, the long-run PT from South Africa is here only 0.20 for both rates. Also Angola's and Malawi's lending rates are cointegrated with the South African Policy rate but the long run multipliers are implausibly high.

Finally there are non-CMA countries with only banking market integration and no monetary integration, such as Botswana where we find for the deposit rate and – very recently – for the lending rate some evidence for cointegration with the South African central bank rate, but only at a very low level. In a similar vein, Zambian deposit and lending rates are related to the South African central bank rate, but also at a very low level and the evidence for cointegration is weak.

In sum, we find the CMA countries ready for further integration when judged from the point of view of financial integration only. Additionally, the Seychelles show a good potential for joining CMA and their further deepening towards a monetary union. In fact, the Seychelles have 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 expansion[17] as there is already some integration evidence for banking markets. These two countries orient themselves to some extent at South African policy rates,

[17] Buigut and Valev (2006) also favour these two countries.

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 combined 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.

6. Conclusions

Monetary and financial integration is high on the agenda of SADC's policy makers and has received increasing attention in the academic literature. We investigate the state, development and drivers of banking market integration in SADC member countries by employing 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. In particular, being a member of a currency area like CMA is found not only to promote banking market integration but also banking market efficiency in term of a faster and more complete PT. But this banking market integration is clearly driven by monetary integration and as such dominated be the largest CMA economy, South Africa. Nevertheless, some other countries have recently been able to join to this convergence club. Some of them are increasingly integrating themselves with these countries in terms of both, money and banking markets, while other countries are integrating only with respect to their banking markets. We therefore conclude that a selective and cautionary expansion of CMA is possible. Seychelles, Zambia and Botswana are potential first candidates. 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 SADCs policy agenda, policy makers will thus also have to turn financial development policies into a central part of their integration vision.

Acknowledgements

We would like to thank the participants at the 2nd Emerging Markets Finance Conference, at the Cass Business School in London in May 2008 and the Biennial Conference of the Economic Society of South Africa in Johannesburg in September 2007 for their helpful comments and suggestions. All remaining errors are our sole responsibility.

Appendix

[Insert Table A-1 here]

References

Adam, K., Jappelli, T., Menichini, A., Padula, M. and Pagano, M. (2002) Analyse, compare, and apply alternative indicators and monitoring methodologies to measure the evolution of capital market integration in the European Union, Economic Report to the European Commission, http://europa.eu.int/comm/internal_market/economic-reports/docs/020128_cap_mark_int_en.pdf.

Aziakpono, M. J. (2008) Financial and monetary autonomy and interdependence between South Africa and the other SACU countries, *South African Journal of Economics*, **76**, 189-211.

Aziakpono, M. J. (2006) Financial integration amongst the SACU countries: Evidence from interest rate pass-through analysis, *Studies in Economics and Econometrics*, **30**, 1-23.

Aziakpono, M. J. (2004) Financial intermediation and economic growth in a highly dependent African economy: Evidence from Lesotho, Final research report on the 17th OSSREA Social Science Research Grant Competition.

Baele, L., Ferrando, A., Hördahl, P., Krylova, E. and Monnet, C. (2004) Measuring financial integration in the euro area, *Oxford Review of Economic Policy*, **20**, 509-530.

Banerjee, A., Lumsdaine, R. L. and Stock, J. H. (1992) Recursive and sequential test of the unit-root and trend-break hypotheses: Theory and international evidence, *Journal of Business & Economic Statistics*, **10**, 271-287.

Becker, B. and Hall, S. G. (2008) A new look at economic convergence in Europe: A common factor approach, *International Journal of Finance and Economics*, forthcoming.

Buigut, S. K. and Valev, N. T. (2006) Eastern and Southern Africa monetary integration: A structural vector autoregression analysis, *Review of Development Economics*, **10**, 586-603.

Cooper, R. N. (1971) Towards an international capital market?, in *North American and Western European Economics Policies* (Eds.) P. C. Kindleberger and A. Schonfield, St. Martin's Press, New York, pp. 192-208.

Engle, R. F. and Granger, C. W. J. (1987) Co-integration and error correction: Representation estimation and testing, *Econometrica*, **55**, 251-276.

Fernandez-Izquierdo, A. and Lafuente, J. A. (2004) International transmission of stock exchange volatility: empirical evidence from the Asian crisis, *Global Finance Journal*, **15**, 125-137.

Figueira, C., Nellis, J. G. and Parker, D. (2005) Testing for international financial markets integration, The Cranfield School of Management Working Paper Series, SWP 2/05.

Gilmore, C. G., Lucey, B. M. and McManus, G. M. (2008) The dynamics of Central European equity market comovements, *Quarterly Review of Economics and Finance*, **48**, 605-622.

Jenkins, C. and Thomas, L. (1998) Is Southern Africa ready for Regional Monetary Integration?, in *Post-Apartheid Southern Africa: Economic Challenges and Policies for the Future* (Ed.) L. Petersson, Routledge, London, pp. 145-170.

Jolliffe, I. T. (2002) *Principal Component Analysis*, Springer, New York.

Kabundi, A. and Loots, E. (2007) Co-movement between South Africa and the Southern African Development Community: An empirical analysis**,** *Economic Modelling*, **24**, 737-748.

Kaiser, H. F. (1960) The application of electronic computers to factor analysis, *Educational and Psychological Measurement*, **20**, 141-151.

Khamfula, Y. and Huizinga, H. (2004) The Southern African Development Community: suitable for a monetary union?, *Journal of Development Economics*, **73**, 699-714.

Kleimeier, S. and Sander, H. (2007) Integrating Europe's retail banking markets: Where do we stand?, CEPS Research Report on Finance and Banking, Center for European Policy Studies, Brussels.

Kleimeier, S. and Sander, H. (2000) Regionalisation versus globalisation in European financial market integration: Evidence from co-integration analysis, *Journal of Banking and Finance*, **24**, 1005-1043.

Kremers, J. J. M., Ericsson, N. R. and Dolado, J. J. (1992) The power of cointegration tests, *Oxford Bulletin of Economics and Statistics*, **54**, 325-348.

Logue, D. E., Salant, M. A. and Sweeney, R. J. (1976) International integration of financial markets: survey, synthesis and results, in *Eurocurrencies and the International Monetary System* (Eds.) Stern, C. H., Makin, J. and Logue, D.E., American Enterprise Institute, Washington DC, pp. 91-138.

McCarthy, C. L. (2002) Macroeconomic convergence in SADC – a policy perspective for the central banks of the integration arrangement, Report submitted to the Committee of Central Bank Governors in SADC, http://www.sarpn.org.za/documents/d0000559/P512_Macro-economic_SADC.pdf.

Meric, I., Ratner, M. and Meric, G. (2008) Co-movements of sector index returns in the world's major stock markets in bull and bear markets: Portfolio diversification implications, *International Review of Financial Analysis*, **17**, 156-177.

Nellis, J. G. (1982) A principal components analysis of international financial integration under fixed and floating exchange rate regimes, *Applied Economics*, **14**, 339-354.

Nielsen, H., Uanguta, E. and Ikhide, S. (2005) Financial integration in the common monetary area, *South African Journal of Economics*, **73**, 710-721.

Perignon, C., Smith, D. R. and Villa, C. (2007) Why common factors in international bond returns are not so common, *Journal of International Money and Finance*, **26**, 284-304.

Rose, A. K. (2001) Currency unions and trade: The effect is large, *Economic Policy*, **33**, 449-461.

Rossouw, J. (2006) An analysis of macro-economic convergence in SADC, *South African Journal of Economics*, **74**, 382-390.

Sander, H. and Kleimeier, S. (2004) Convergence in Eurozone retail banking? What interest rate pass-through tells us about monetary policy transmission, competition and integration, *Journal of International Money and Finance*, **23**, 461-492.

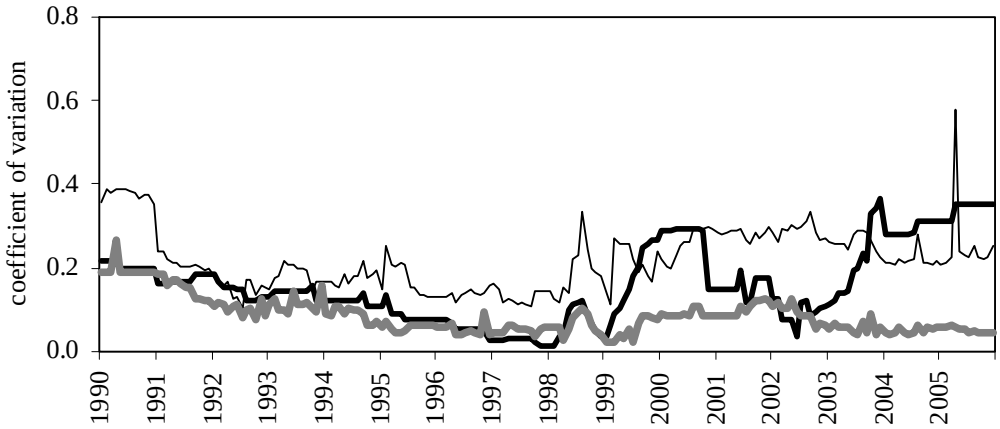
Sander, H. and Kleimeier, S. (2006) Interest rate pass-through in the Common Monetary Area of the SACU countries, *South African Journal of Economics*, **74**, 215-229.

Siliverstovs, B., L'Hegaret, G. Neumann, A. and von Hirschhausen, C. (2005) International market integration for natural gas? A cointegration analysis of prices in Europe, North America and Japan, *Energy Economics*, **27**, 603-615.

Tsangarides, C. G. and Qureshi, M. S. (2008) Monetary union membership in a cluster analysis, *World Development*, **36**, 1261–1279.

Figure 1: The development of central bank and retail interest rates in Southern Africa

Panel A: CMA



Panel B: SACU

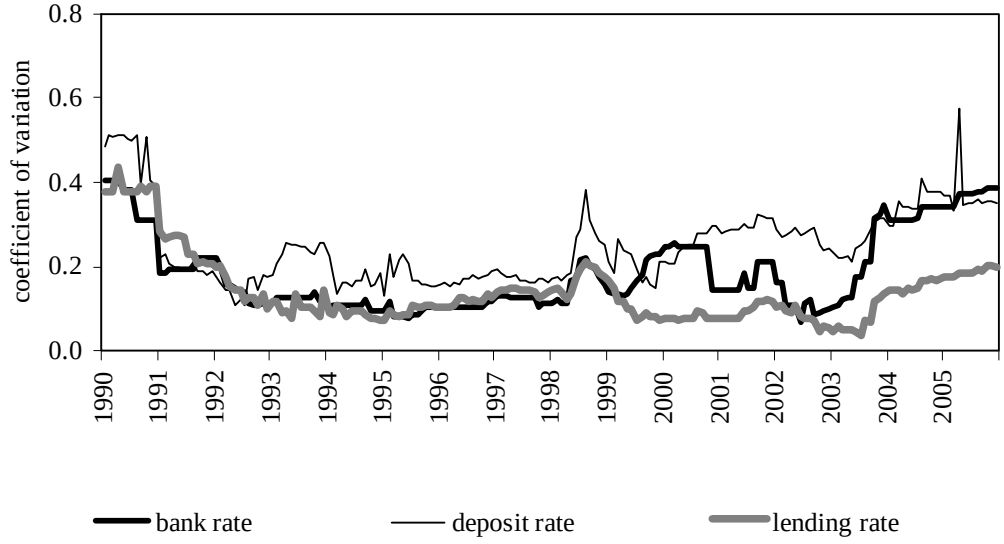
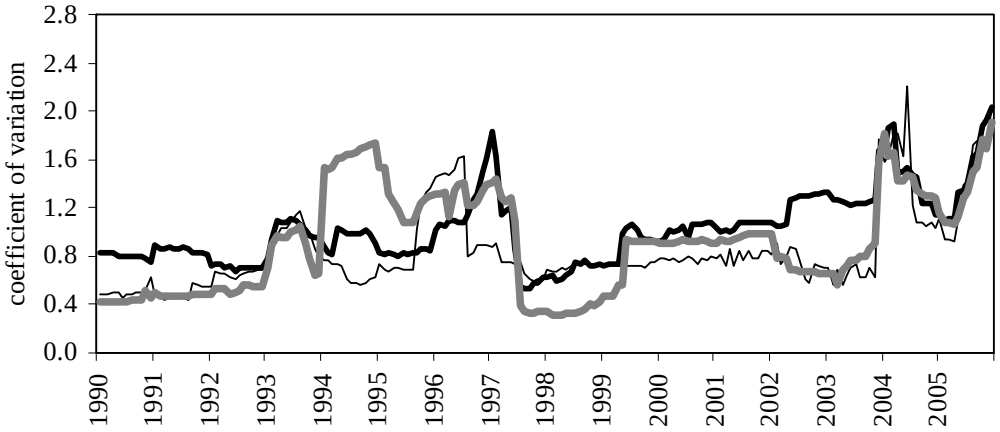
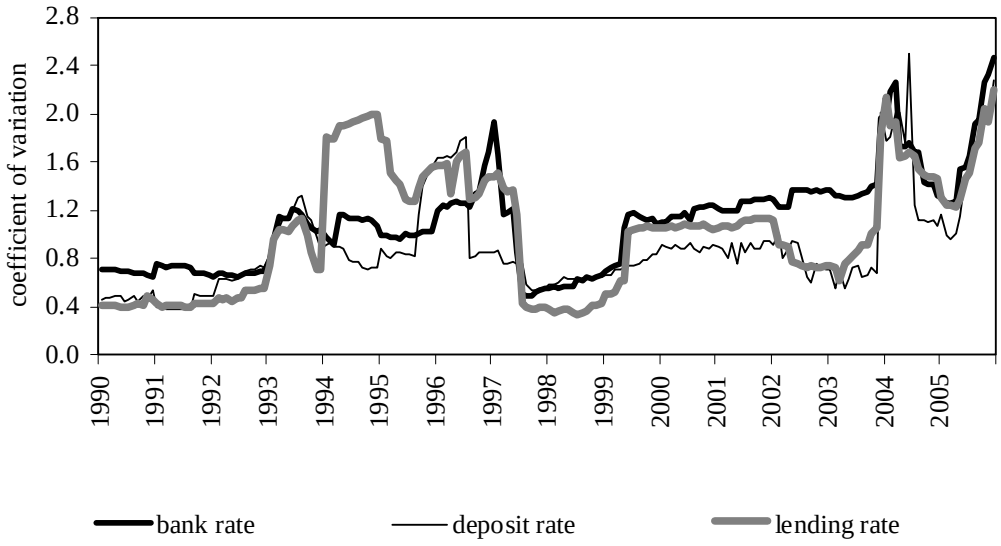


Figure 1 continued: The development of central bank and retail interest rates in Southern Africa

Panel C: OTHER



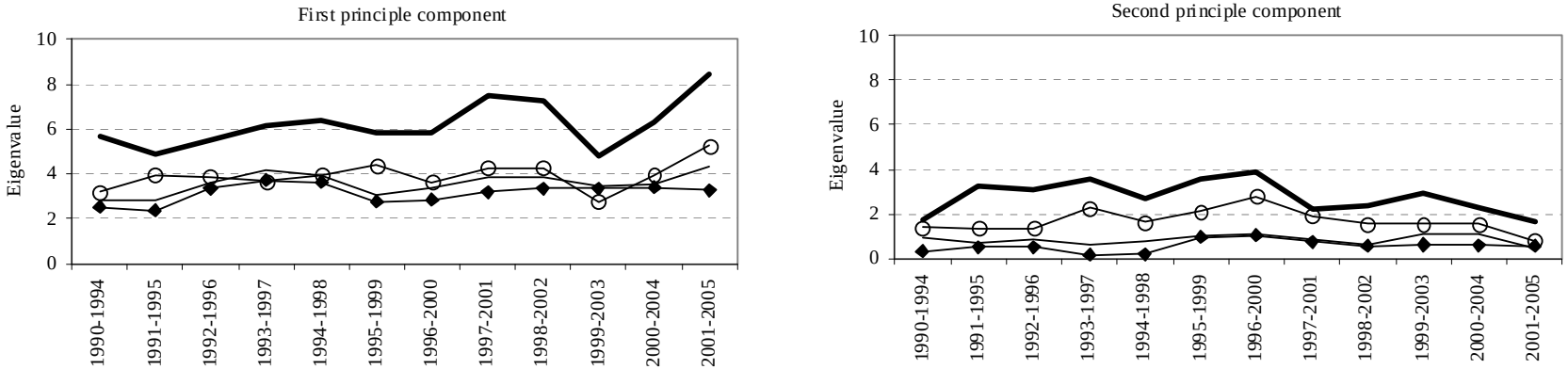
Panel D: SADC



Notes: The regional groups comprise the following countries: CMA = Lesotho, Namibia, South Africa, Swaziland; SACU = all CMA countries and Botswana; OTHER = Angola, DR Congo, Madagaska, Malawi, Mauritius, Mozambique, Seychelles, Tanzania, Zambia, Zimbabwe; SADC = all OTHER and SACU countries. The coefficient of variation is defined as the standard deviation divided by the average of all interest rates in the region.

Figure 2: Eigenvalues as an indicator of integration

Panel A: Bank rates



Panel B: Deposit rates

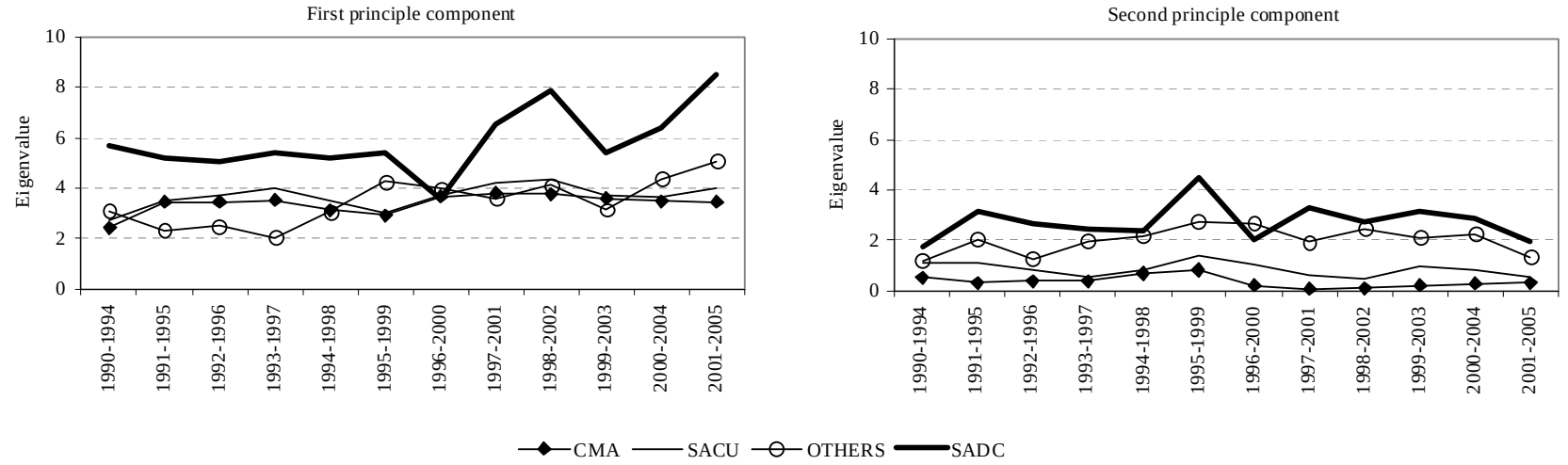
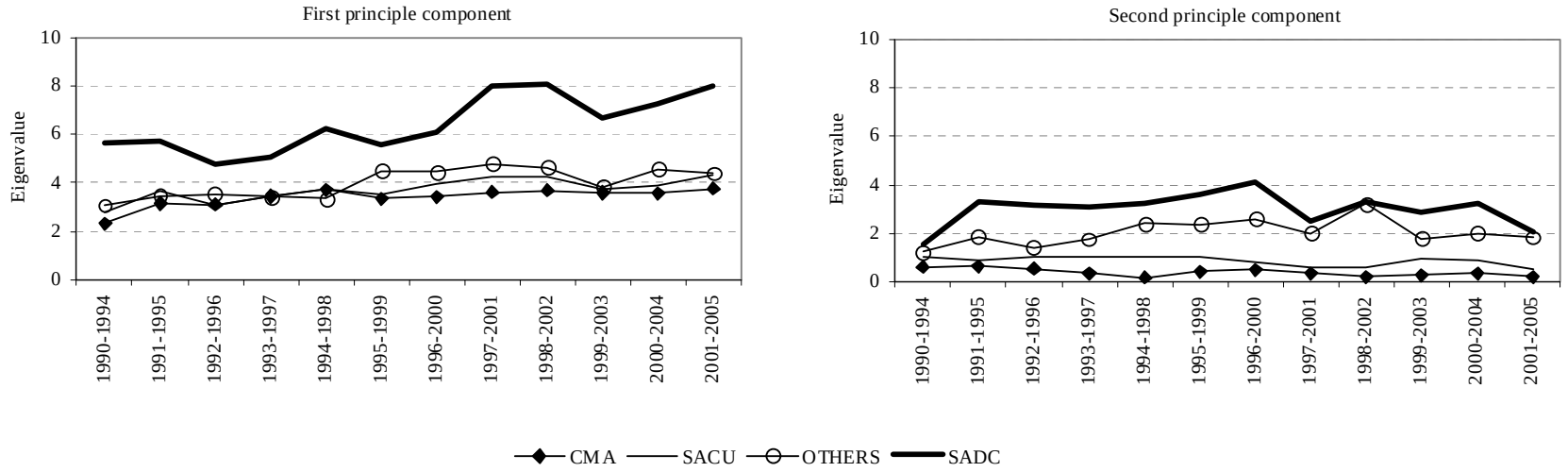


Figure 2 continued: Eigenvalues as an indicator of integration

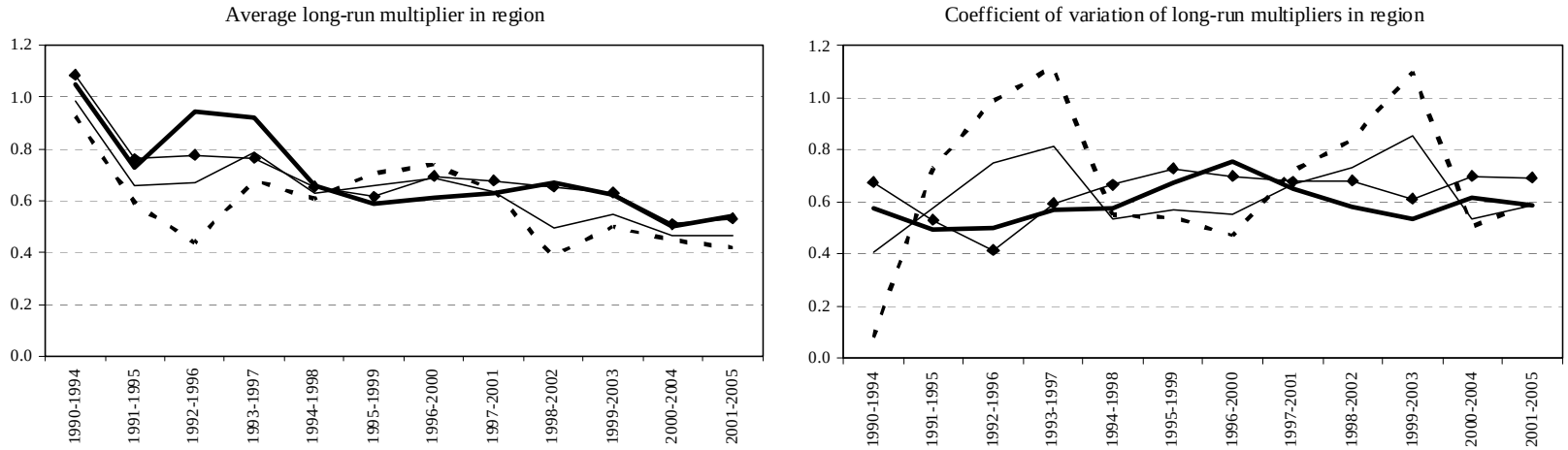
Panel C: Lending rates



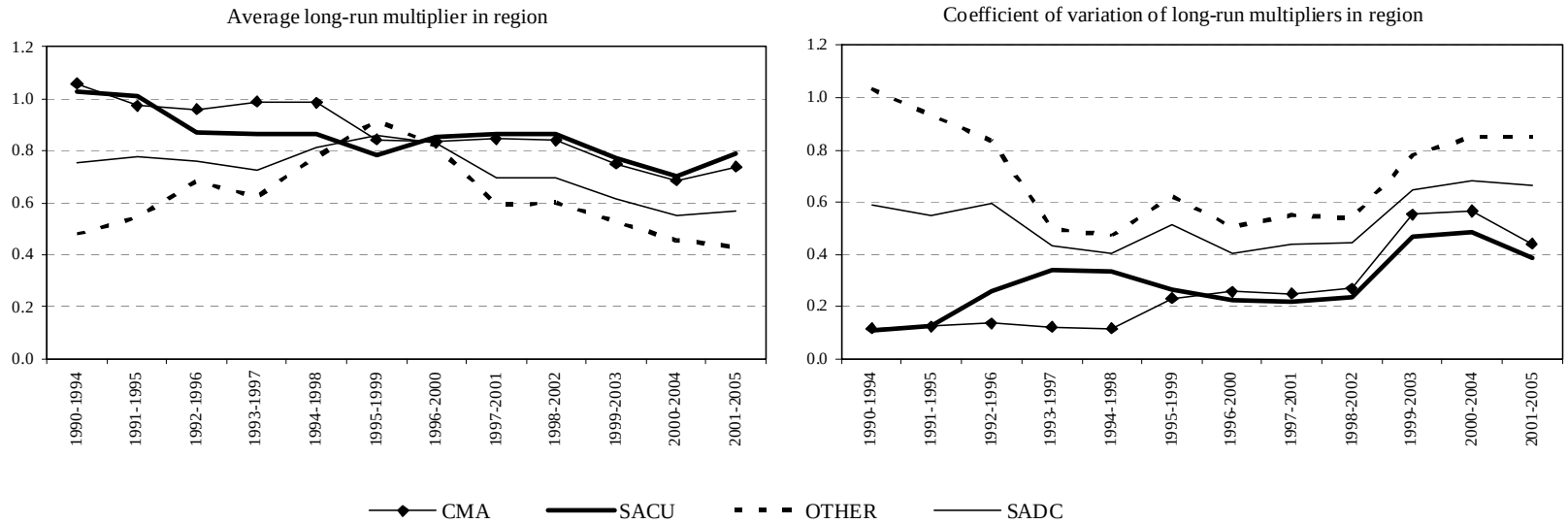
Notes: For the country-composition of the regions, see notes to Figure 1.

Figure 3: The pass-through of national bank rates to national deposit and lending rates

Panel A: Deposit rates



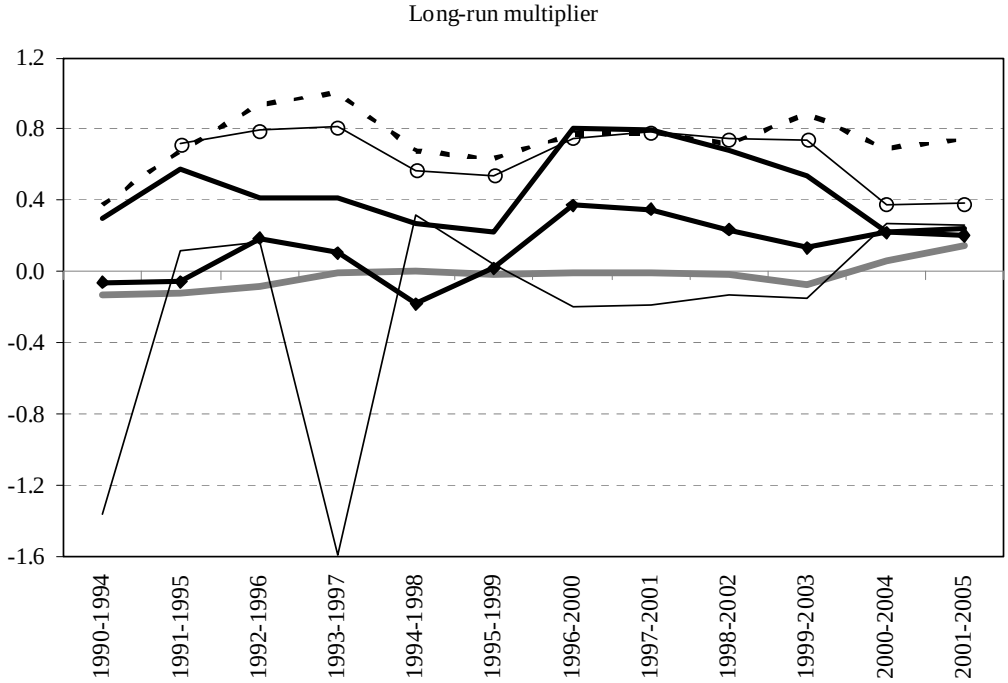
Panel B: Lending rates



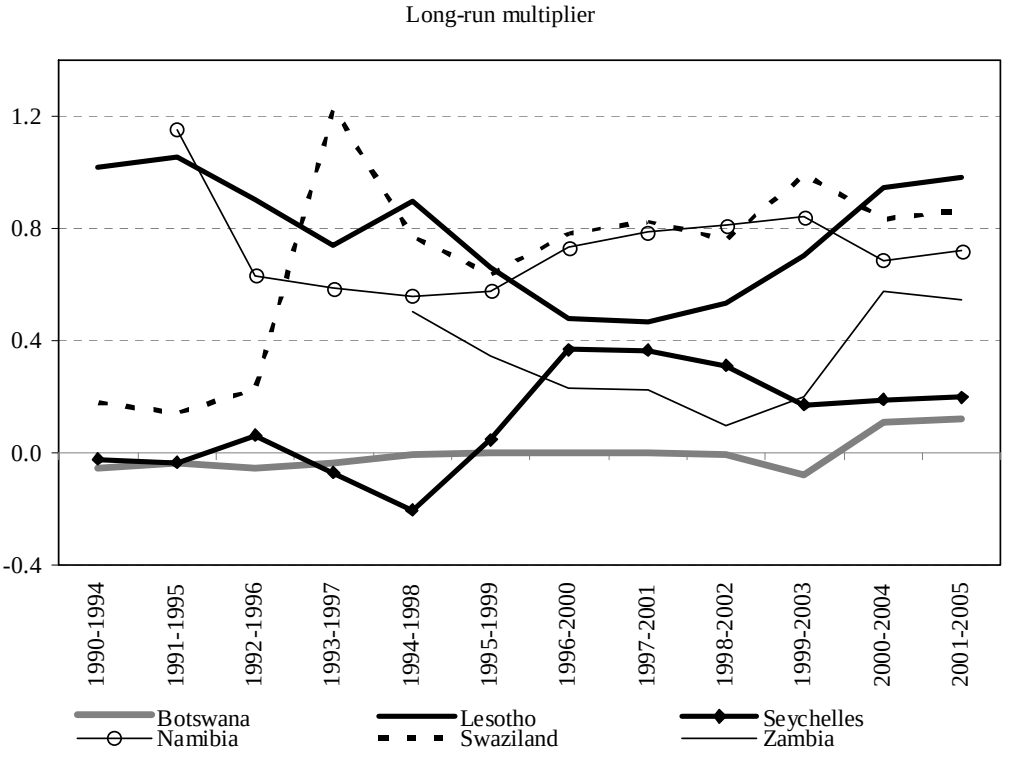
Notes: For the country-composition of the regions, see notes to Figure 1.

Figure 4: The role of the South African central bank rate for national retail rates

Panel A: Deposit rates



Panel B: Lending rates



Note: For the country-composition of the regions, see notes to Figure 1.

Table 1: Economic conditions and financial development

	Lesotho	Namibia	South Africa	Swazi-land	**CMU**	Botswana	**SACU**	Angola	Mada-gascar	Malawi	Mauritius	Mozam-bique	Sey-chelles	Tanzania	Zambia	Zim-babwe	**OTHERS**	**SADC**
Panel A: Average annual real GDP growth																		
1990 to 1994	4.4%	4.4%	0.2%	3.9%	**0.4%**	4.4%	**0.6%**	-5.9%	0.0%	1.3%	5.3%	4.4%	4.5%	2.5%	-0.8%	2.8%	**1.6%**	**0.9%**
1995 to 1999	3.6%	3.6%	2.6%	3.7%	**2.6%**	8.0%	**2.8%**	7.9%	3.2%	6.9%	4.9%		3.4%	3.8%	1.5%	2.5%	**3.7%**	**3.1%**
2000 to 2005	2.6%	4.6%	3.9%	1.9%	**3.9%**	5.3%	**3.9%**	9.3%	2.9%	2.6%	4.2%		1.2%	6.5%	4.6%	-6.1%	**1.9%**	**3.4%**
Panel B: Average annual inflation rate																		
1990 to 1994	13.6%	12.2%	12.4%	11.1%	**12.4%**	12.8%	**12.4%**	677.7%	16.8%	21.1%	8.6%	46.2%	2.5%	29.0%	121.7%	26.5%	**115.0%**	**42.1%**
1995 to 1999	8.1%	8.3%	7.3%	8.0%	**7.4%**	8.7%	**7.4%**	1478.3%	17.9%	40.9%	6.6%	22.9%	1.6%	17.2%	30.7%	30.6%	**210.1%**	**66.1%**
2000 to 2005	7.6%	7.2%	5.1%	7.6%	**5.3%**	8.0%	**5.4%**	126.1%	11.0%	17.2%	4.9%	12.0%	3.4%	4.0%	21.2%	90.9%	**45.2%**	**16.9%**
Panel C: Average annual spread between lending and deposit rate																		
1990 to 1994	7.1%	8.9%	3.9%	6.0%	**4.1%**	1.7%	**4.0%**		5.8%	7.1%	6.8%		6.3%	14.5%	16.3%	2.1%	**5.7%**	**4.5%**
1995 to 1999	6.8%	7.5%	4.9%	7.4%	**5.0%**	4.7%	**5.0%**	42.3%	15.8%	15.3%	9.6%	14.5%	6.5%	17.2%	17.1%	12.2%	**17.7%**	**8.7%**
2000 to 2005	10.4%	6.2%	4.9%	7.0%	**5.0%**	6.0%	**5.0%**	58.6%	11.9%	22.1%	12.0%	10.4%	6.5%	12.4%	19.7%	73.7%	**34.5%**	**13.6%**
Panel D: Average annual credit to GDP																		
1990 to 1994	17.8%	33.0%	44.5%	23.1%	**43.4%**	13.6%	**42.5%**		16.3%	10.9%	38.5%	12.5%	7.9%	11.6%	6.2%	17.4%	**14.8%**	**34.5%**
1995 to 1999	17.6%	46.9%	64.1%	16.5%	**62.0%**	12.5%	**60.5%**	3.9%	9.7%	4.9%	50.8%	13.0%	13.4%	4.5%	7.6%	23.1%	**16.2%**	**47.7%**
2000 to 2005	10.2%	47.9%	67.3%	14.8%	**64.9%**	18.4%	**63.5%**	4.4%	9.0%	5.9%	64.1%	13.0%	24.0%	7.0%	7.0%	20.3%	**17.5%**	**50.2%**
Panel E: Average annual deposits to GDP																		
1990 to 1994	33.6%	31.1%	47.1%	27.8%	**46.1%**	19.4%	**45.3%**		15.2%	16.4%	61.4%	21.3%	42.5%	15.3%	14.6%	17.6%	**20.1%**	**38.0%**
1995 to 1999	30.7%	42.0%	51.0%	23.1%	**49.8%**	23.7%	**49.0%**	16.0%	13.9%	12.9%	71.2%	18.3%	73.3%	14.3%	14.9%	21.8%	**23.7%**	**41.7%**
2000 to 2005	24.7%	39.9%	53.7%	18.9%	**52.2%**	27.1%	**51.4%**	14.9%	15.5%	15.7%	81.5%	24.5%	95.8%	17.0%	18.5%	30.0%	**28.7%**	**44.8%**

Notes regarding data source: 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: The explanatory power of the first principle component

	Cumulative R^2 of the first principle component			
Period	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 rate				
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 rate				
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: For the country-composition of the regions, see notes to Figure 1.

Table 3: Principal components analysis of convergence groups among SADC countries for 2000 to 2005

	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
	Panel A: Bank rate						Panel B: Deposit rate					
Eigenvalue												
PC#1	7.357	5.532	1.604	na	na	na	7.727	4.81	1.506	1.516	na	na
PC#2	1.798	0.772	0.396	na	na	na	2.106	0.842	0.494	0.484	na	na
PC#3	1.152	na	na	na	na	na	1.316	0.664	na	na	na	na
PC#4	0.663	na	na	na	na	na	1.031	na	na	na	na	na
Cumulative R^2												
PC#1	0.613	0.791	0.802	na	na	na	0.552	0.687	0.753	0.758	na	na
PC#2	0.763	0.901	1.000	na	na	na	0.702	0.807	1	1	na	na
PC#3	0.859	na	na	na	na	na	0.796	0.902	na	na	na	na
PC#4	0.914	na	na	na	na	na	0.871	na	na	na	na	na
Factor loading of vector 1												
Angola	-0.329	-0.358					-0.282					-0.282
Botswana	-0.129			0.512			-0.237	-0.296				
Lesotho	-0.205	-0.289					-0.263	-0.368				
Madagascar	0.219		0.707				0.201		0.707			
Malawi	-0.303	-0.351					-0.284			0.707		
Mauritius							-0.246				-0.587	
Mozambique							-0.296			0.707		
Namibia	-0.348	-0.413					-0.249	-0.375				
Seychelles	-0.351	-0.414					-0.341	-0.301				
South Africa	-0.344	-0.401					-0.254	-0.444				
Swaziland	-0.346	-0.403					-0.323	-0.443				
Tanzania	0.223		0.707				0.066		0.707			
Zambia	-0.296				0.416		-0.336	-0.401				
Zimbabwe	0.272					-0.649	0.252					-0.455

Table 3 continued: Principal components analysis of convergence groups among SADC countries for 2000 to 2005

	Convergence groups					
	Full sample	Group 1	Group 2	Group 3	Group 4	Group 5
Panel C: Lending rate						
Eigenvalue						
PC#1	7.999	6.683	1.685	1.691	na	na
PC#2	2.826	0.569	0.316	0.309	na	na
PC#3	1.028	0.352			na	na
PC#4	0.827				na	na
Cumulative R^2						
PC#1	0.571	0.835	0.842	0.846	na	na
PC#2	0.773	0.907	1.000	1.000	na	na
PC#3	0.847	0.951	na	na	na	na
PC#4	0.906	na	na	na	na	na
Factor loading of vector 1						
Angola	-0.278	-0.312				
Botswana	-0.112		0.707			
Lesotho	-0.349	-0.379				
Madagascar	-0.039			0.707		
Malawi	-0.319	-0.352				
Mauritius	0.029				0.933	
Mozambique	-0.156		0.707			
Namibia	-0.329	-0.364				
Seychelles	-0.328	-0.358				
South Africa	-0.335	-0.371				
Swaziland	-0.321	-0.351				
Tanzania	-0.203			0.707		
Zambia	-0.312	-0.338				
Zimbabwe	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.

Table 4: 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 5: Region and time patterns in the national pass-through in SADC banking markets

	Dependent variable: Multiplier for a +1% shock						Dependent variable: Multiplier for a +1% shock					
Independent variable	Impact	1 month	3 months	6 months	12 months	long-run	Impact	1 month	3 months	6 months	12 months	long-run
	Panel A: Loan rates						Panel B: Deposit rates					
Intercept	0.25	0.31	0.38	0.43	0.46	0.48	0.21	0.25	0.32	0.36	0.40	0.42
	2.43	*3.23*	*3.92*	*4.40*	*4.63*	*4.71*	*2.17*	*2.42*	*3.02*	*3.39*	*3.57*	*3.66*
Regional dummies:												
CMA	0.23	0.35	0.33	0.31	0.28	0.24	0.20	0.21	0.19	0.15	0.12	0.10
	3.46	*5.75*	*5.41*	*4.94*	*4.41*	*3.71*	*3.23*	*3.22*	*2.80*	*2.25*	*1.73*	*1.36*
Botswana	0.05	0.13	0.21	0.22	0.19	0.15	-0.17	-0.08	0.00	0.07	0.12	0.15
	0.47	*1.29*	*1.97*	*2.02*	*1.78*	*1.39*	*-1.70*	*-0.72*	*0.03*	*0.62*	*1.02*	*1.19*
Time dummies:												
1990-1994	0.01	0.03	0.05	0.08	0.13	0.16	0.20	0.22	0.31	0.40	0.46	0.51
	0.06	*0.19*	*0.33*	*0.54*	*0.84*	*1.01*	*1.33*	*1.36*	*1.89*	*2.36*	*2.62*	*2.77*
1991-1995	0.05	0.11	0.13	0.15	0.16	0.18	0.06	0.07	0.10	0.12	0.15	0.18
	0.30	*0.80*	*0.93*	*1.01*	*1.11*	*1.20*	*0.41*	*0.47*	*0.64*	*0.79*	*0.92*	*1.04*
1992-1996	0.05	0.11	0.12	0.13	0.16	0.19	0.08	0.07	0.08	0.11	0.15	0.19
	0.34	*0.87*	*0.89*	*0.96*	*1.15*	*1.29*	*0.58*	*0.49*	*0.55*	*0.72*	*0.91*	*1.17*
1993-1997	0.12	0.15	0.15	0.14	0.14	0.15	0.05	0.11	0.17	0.23	0.28	0.31
	0.85	*1.14*	*1.11*	*1.00*	*0.98*	*1.03*	*0.34*	*0.77*	*1.12*	*1.48*	*1.74*	*1.89*
1994-1998	0.13	0.16	0.18	0.19	0.20	0.24	0.03	0.10	0.13	0.14	0.15	0.16
	0.92	*1.22*	*1.31*	*1.37*	*1.47*	*1.72*	*0.25*	*0.73*	*0.87*	*0.97*	*0.99*	*1.00*
1995-1999	0.28	0.26	0.24	0.25	0.27	0.29	0.14	0.19	0.19	0.19	0.19	0.19
	1.96	*1.93*	*1.78*	*1.78*	*1.90*	*1.99*	*1.05*	*1.31*	*1.28*	*1.28*	*1.22*	*1.14*
1996-2000	0.23	0.23	0.24	0.23	0.24	0.26	0.14	0.18	0.20	0.22	0.22	0.22
	1.65	*1.80*	*1.79*	*1.70*	*1.75*	*1.86*	*1.06*	*1.28*	*1.38*	*1.46*	*1.44*	*1.40*
1997-2001	0.08	0.13	0.13	0.12	0.12	0.13	0.03	0.08	0.13	0.16	0.17	0.17
	0.58	*0.97*	*1.00*	*0.88*	*0.86*	*0.93*	*0.25*	*0.60*	*0.89*	*1.07*	*1.11*	*1.06*
1998-2002	0.05	0.06	0.07	0.07	0.07	0.13	-0.02	0.02	0.02	0.03	0.02	0.03
	0.35	*0.47*	*0.56*	*0.50*	*0.53*	*0.95*	*-0.15*	*0.12*	*0.17*	*0.18*	*0.14*	*0.18*
1999-2003	0.04	0.02	0.02	0.01	0.01	0.05	0.06	0.12	0.10	0.09	0.09	0.08
	0.27	*0.12*	*0.12*	*0.06*	*0.05*	*0.38*	*0.46*	*0.82*	*0.72*	*0.59*	*0.55*	*0.51*
2000-2004	-0.04	-0.02	-0.01	-0.01	-0.02	-0.02	-0.02	-0.01	0.00	0.01	0.01	0.00
	-0.29	*-0.18*	*-0.06*	*-0.10*	*-0.14*	*-0.14*	*-0.15*	*-0.04*	*0.00*	*0.04*	*0.03*	*0.01*
Adjusted R^2	0.06	0.17	0.15	0.13	0.11	0.08	0.06	0.03	0.02	0.02	0.02	0.03

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 147 and 143 observations, respectively. Multipliers for all SADC countries are included. The time period 2001-2005 serves as a benchmark for the time dummies.

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

Country	Exchange rate system	Exchange control on current account transactions	Restrictions on capital account transactions
Angola	Free floating exchange rate system.	Almost all current account transactions have been liberalised.	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.	Exchange control was abolished effective February 8, 1999.	Full capital account convertibility since February 1999.
Lesotho	Fixed exchange rate regime (Pegged at par with the South African Rand –CMA).	Lesotho acceded to Article VIII status under the IMF Articles of Agreement. Hence no controls on current account transactions.	No restrictions on capital accounts within CMA. Limited reforms on capital account since June 27, - 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.	Mauritius has adopted Article VIII, section 2, 3 and 4, of the IMF Articles of Agreement with effect from September 1993.	There are no restrictions on capital account transactions in respect of both inward and outward investments.

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

Mozambique	Free floating system.	No restrictions are imposed on the exports of goods. The import of goods must be preceded by negotiation of foreign currency with commercial banks. There are no restrictions on the entry of earnings for services. Payments for services exceeding a value equivalent to US$5 000.00 must be licensed by the central bank.	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.	There are no restrictions on current account Namibia acceded to Article VIII of the IMF in 1996.	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		
South Africa	Free floating system.	No restrictions on current account transactions.	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.	Same as South Africa.
Tanzania	Managed floating exchange rate system.	No restrictions on current account transactions in line with IMF's Article VIII since 1996.	The capital account is not fully liberalised.
Zambia	Fully market determined.	The is no exchange control on current account.	The are no exchange controls on capital account.
Zimbabwe	Foreign currency Auction System- since January 2004.	There are some exchange controls on current account transaction due to critical shortage of foreign currency – even though Zimbabwe has ratified the Article VIII of the IMF.	The are exchange controls on capital account.

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