Unclassified **DEV/DOC(2003)29**

Organisation de Coopération et de Développement Economiques
Organisation for Economic Co-operation and Development

15-Jan-2004

English text only

DEVELOPMENT CENTRE

DEV/DOC(2003)29
Unclassified

WORKING PAPER No. 231
MACROECONOMIC CONVERGENCE IN SOUTHERN AFRICA: THE RAND ZONE EXPERIENCE

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JT00156762

English text only

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ACKNOWLEDGEMENTS

The Development Centre would like to express its gratitude to the Swiss Agency for Development Cooperation for the financial support given to the project which gave rise to this study.

The author wishes to acknowledge Colm Foy, Charles Harvey, Ulrich Hiemenz, Jonhatan Leape, Helmut Reisen, Marc Senegas, Lynne Thomas, and participants at OECD Development Centre, University of Bordeaux IV, University of Crete and DELTA seminars for valuable comments to a former version.

RÉSUMÉ

Ce Document de travail s'efforce de répondre à deux questions : *1)* la zone monétaire commune de l'Afrique australe (*Common Monetary Area* - CMA) a-t-elle vraiment réussi à devenir une zone monétaire optimale ? *2)* quels sont les coûts et les avantages de la CMA pour les pays participants ? Nous avons effectué un exercice économétrique en deux étapes basé sur la théorie des parités de pouvoir d'achat généralisées. D'après les résultats économétriques, la CMA (avec le Botswana comme membre *de facto*) est effectivement une zone monétaire optimale étant donné les évolutions communes sur le long terme de leurs taux de change bilatéraux. Nous avons également mis en évidence que le bon fonctionnement de l'union monétaire — mesuré par le degré de corrélation des prix relatifs — dépend de plusieurs facteurs. Ces derniers révèlent à la fois les coûts et les avantages de l'appartenance à une union monétaire. D'un côté, plus les économies sont ouvertes et diversifiées de façon comparable, plus elles tireront parti de leur association. D'un autre côté, moins leurs cycles de production et d'échanges sont synchronisés et plus les flux de capitaux qu'elles attirent sont différents, plus elles vont payer le coût de l'association. Enfin, une ouverture accrue se traduit par des effets conjoints positifs et des progrès similaires de la diversification.

SUMMARY

In this paper we aim to answer the following two questions: *1) has the Common Monetary Area in Southern Africa (henceforth CMA) ever been an optimal currency area (OCA)? 2) What are the costs and benefits of the CMA for its participating countries?* In order to answer these questions, we carry out a two-step econometric exercise based on the theory of generalised purchasing power parity (G-PPP). The econometric evidence shows that the CMA (but also Botswana as a de facto member) form an OCA given the existence of common long-run trends in their bilateral real exchange rates. Second, we also test that in the case of the CMA and Botswana the smoothness of the operation of the common currency area — measured through the degree of relative price correlation — depends on a variety of factors. These factors signal both the advantages and disadvantages of joining a monetary union. On the one hand, the more open and more similarly diversified the economies are, the higher the benefits they will reap from having joined. On the other hand, the less synchronised their business cycles are, and the more different the kind of capital inflows are, the higher the costs they will have to bear. Finally, there is a positive joint effect from a higher degree of openness and similarly higher degrees of diversification.

I. INTRODUCTION

The goal of this paper is to give some answers to two questions in light of the ongoing monetary integration process in Southern Africa, currently known as the "Rand Zone": *1) Has the Common Monetary Area in Southern Africa (henceforth CMA) ever been an optimal currency area? 2) What are the costs and benefits of the CMA for its participating countries?* To our knowledge, these problems have yet to be adequately addressed (see Tjirongo, 1995; Jenkins and Thomas, 1997; CREFSA, 1997; Honohan and O'Connell, 1997; Vollan, 2000; or Mkenda, 2001, among others). Moreover, recent episodes concerning heightened emerging markets financial volatility, liquidity crisis and credit rationing call for a better understanding of the role further monetary integration can play to lessen instability and crisis vulnerability.

Before moving on to the main parts of the paper, one caveat is in order. Transferring the CMA's experience to other African sub-regions as a route to monetary integration requires the presence, or creation, of a number of factors present in the Southern African case. Specific to Southern Africa is a setting with a major lead economy (South Africa) and a few small satellites, themselves very dependent on the former and with very limited decision-making power. Overcoming these asymmetries requires institution-building and institution-sharing. Also very relevant to the potential for success of such schemes is the degree of complementarity among members and their ability to realise the standard gains associated with macroeconomic convergence. These factors taken into consideration, there is no reason why the standard benefits from monetary union — low inflation, credibility, financial integration and fiscal solvency should not accrue to member countries.

The paper is organised as follows. In Section II, we present the main features of the CMA since the late 1960s/early 1970s, the time when it was formally set up. In section III, we carry out a two-step econometric exercise based on the theory of generalised purchasing power parity (G-PPP). The purpose is to figure out, on the one hand, whether the CMA has been close to being an optimal currency area (OCA), and on the other, what the costs and benefits of the CMA for its member countries are. More specifically, we begin with a cointegration test whose inputs are the bilateral real exchange rates in the CMA. This test is designed to detect the existence of common fundamental trends. Next, as prescribed by the theoretical literature, we estimate a panel data model aimed at identifying some particular cost/benefit variables that determine the suitability of monetary union. Finally, we conclude by drawing some lessons in view of possible further steps in the current regional integration process. As it stands, the CMA is not a fully-fledged monetary union; so whether member countries are suited or not to move forward to irrevocably adopting the rand or an alternative anchor as the common legal tender remains a very topical problem.

II. A BRIEF REMINDER OF CMA'S HISTORY AND ITS BASIC FEATURES

The Rand Zone has formally been in place since 1974, when South Africa, Botswana, Lesotho and Swaziland signed the Rand Monetary Agreement (RMA). However, the latter three countries (Namibia was a territory under South Africa's administration) did not at that time link their currencies irrevocably to the South African legal tender. The Rand Zone had informally existed prior to 1974 under British rule, using the pound as the common currency until 1961, when the Rand replaced it[1]. The first major event after the RMA occurred when Botswana opted in 1976 to pursue independent monetary and exchange rate policies. Nevertheless, it has since been linked to the rand through a currency basket where the Rand weighs around 60 to 70 per cent (in fact, we will consider Botswana as a "de facto" member of the CMA in what follows). With the signing of the Trilateral Monetary Agreement the CMA replaced the RMA in 1986. Namibia joined in 1992 shortly after gaining independence.

Swaziland, Lesotho and Namibia introduced their own national currencies after becoming independent states (the lilangeni, the loti, dollar and in 1974, 1980 and 1993, respectively), but their exchange rates have remained fixed at parity with the Rand. The Rand is legal tender in Namibia and Lesotho, which South Africa compensates for loss of seignorage. Since 1992, the Rand has not been legal tender in Swaziland (although in practice it is still widely used), opening the possibility of delinking the lilangeni. However, all member countries have maintained the parity of their currencies with the Rand, and foreign-exchange regulations and monetary policy throughout the CMA have continued to reflect the influence of the South African Reserve Bank.

Box 1. **Major Events in CMA History**

Year/Period	Major Events
Before 1961	Informal Monetary Union under British ruling: pound as common currency.
1961-1974	Countries become independent (except Namibia). The Rand replaces the pound as common currency; still informal arrangement.
1974	South Africa, Botswana, Lesotho and Swaziland sign the RMA treaty.
1976	Botswana exits RMA and sets its own monetary policy. However it keeps linked to the Rand (60 to 70 per cent) through a currency basket.
1986	South Africa, Lesotho and Swaziland sign the trilateral agreement CMA, replacing the RMA. Additional provisions concerning capital account liberalisation, intrazone fund transfers and seignorage compensations are made.
1992	Namibia, which became independent in 1990, joins the CMA.

1. During the 1960s those countries became independent and started running their own monetary institutions around South Africa's.

A caveat is in order. The CMA is a hybrid of a currency board and a monetary union. Even though the rand is the dominant currency, member countries have not made an irrevocable commitment to keep a given parity. This makes the arrangement a less than fully-fledged one in Corden's (1972) terms. On the other hand, it is a currency board because foreign assets back domestic currency issuance and the monetisation of fiscal deficits is not allowed. However, unlike an orthodox currency board, the monetary systems are administered by Central Banks which perform functions such as extending loans to their respective governments (Tjirongo, 1995). Member countries have established full capital and current account convertibility among themselves. Compensatory payments for seignorage forgone by those pegging to the rand and other legal provisions for intra-zone transfer of funds were allowed (for further information about the main provisions of this treaty, see Appendix B). It is also worth recalling that these countries together with Botswana belong to the South African Customs Union (SACU), so they have common external tariffs, and hence a common revenue pool tilted to make up for the imbalances in tax collections that arise from asymmetric trade patterns.

About the Trade Links

All participating countries are highly dependent on imports of South African goods, but export only a small part of their total external sales there (Table 1)[2]. This pattern has been the rule throughout the 1990s, which provides preliminary evidence against the idea put forward by Rose (2000) regarding the possible endogenous link between trade and monetary integration. The CMA case shows that monetary integration has not significantly boosted intra-zone trade intensities. Moreover, intra-zone trade patterns look rather inter-industrial, with South Africa a net manufactured goods provider. But even for South Africa, its main trade partners are not its neighbours, they are principally the UK, the EU and the US. The existence of SACU may be having, in consequence, a trade-diversion effect. Nevertheless, as the proceeds of the common revenue pool represent a substantial part of total tax collection in all South African partners, lowering external tariffs or diversifying trade away from extra-zone countries to South Africa may bring about a fiscal problem.

Table 1. **Directions of Trade**

Country	% Exports to SACU		% Exports to Rest		% Imports from SACU		% Imports from Rest	
	1996	*2000*	*1996*	*2000*	*1996*	*2000*	*1996*	*2000*
Botswana	18.3	6.7	81.7	93.3	78.0	73.9	22.0	26.1
Lesotho	48.5	39.1	51.5	60.9	92.2	88.2	7.8	11.8
Namibia	24.0	n.a.	76.0	n.a	88.5	n.a	11.5	n.a
South Africa	11.0	n.a	89.0	n.a	2.0	n.a	98.0	n.a
Swaziland	78.2	78.5	21.8	21.5	90.3	88.8	9.7	11.2

Note: SACU: South African Customs Union.
Source: see Appendix.

2. Only Swaziland, a very small country, does export significantly to SACU countries.

III. A TWO-STEP ECONOMETRIC EXERCISE TO TEST FOR CONFORMITY WITH OCA CRITERIA

In this section we carry out a two-step econometric exercise. This exercise draws on assumptions of a generalised version of the Purchasing Power Parity theory (G-PPP). The purpose is to figure out on the one hand, whether the CMA has been close to forming an optimal currency area (OCA), and on the other, what are the costs and benefits of CMA for its member countries. In a first step, we test the null of bilateral real exchange rates (RER) cointegration, i.e. the existence of a long-run relationship between the RER in CMA countries. This is intended as a preliminary attempt to check whether the member countries form an OCA. In the second step, we run a panel data model aimed at answering which cost and which benefit factors have empirically influenced upon the need of different RER adjustments, i.e. a deviation from G-PPP (for instance when external shocks come about). Our sample period spans 1990-2001 for two reasons: *a)* it is the time when Namibia becomes independent, though it formally joins the CMA in 1992, and *b)* a new political era begins in South Africa after the end of the apartheid regime (Mandela is set free).

III.1. Real Exchange Rate Co-Movements and the Theory of Generalised PPP

A first way to assess the optimality of currency areas is by looking at real exchange rate correlations, on the assumption that correlations reflect common fundamental trends. These trends basically refer to the long run productivity growth, the tradability of domestically produced goods and other economic aspects. Which real exchange rate measure should be used?

The most relevant RER measure in our view is the bilateral real exchange rate of each country *vis-à-vis* South Africa, the current anchor country[3]. There, we would expect to see quite stable or only slightly divergent paths as long as no considerable inflation differentials are observed. Furthermore, as most of these countries have fixed their exchange rates to the rand and part of their CPI depends on South African prices, as we

3. The US dollar real exchange rate may be a misleading measure of that kind, for a simple reason: even supposing the shares of exports to the US equalises across CMA countries (including Botswana), the import sides are clearly unequal. While South Africa imports very little from its partners, the latter import near 90 per cent of their total imports from South Africa. Given the high tradability of the consumer price indices in all these, any inflation surge in South Africa derived from a depreciation of the Rand against the USD will be almost fully transferred to their own inflation. Despite having brought inflation down, South Africa-US inflation differentials have not been of minor importance over the last decade (1990s).

saw above, those series should revert to a mean. The bilateral exchange rates with respect to South Africa (SA) are defined in the following way:

$$RER_i = e_{i,sa} * \frac{P_{sa}}{P_i}$$

Where:

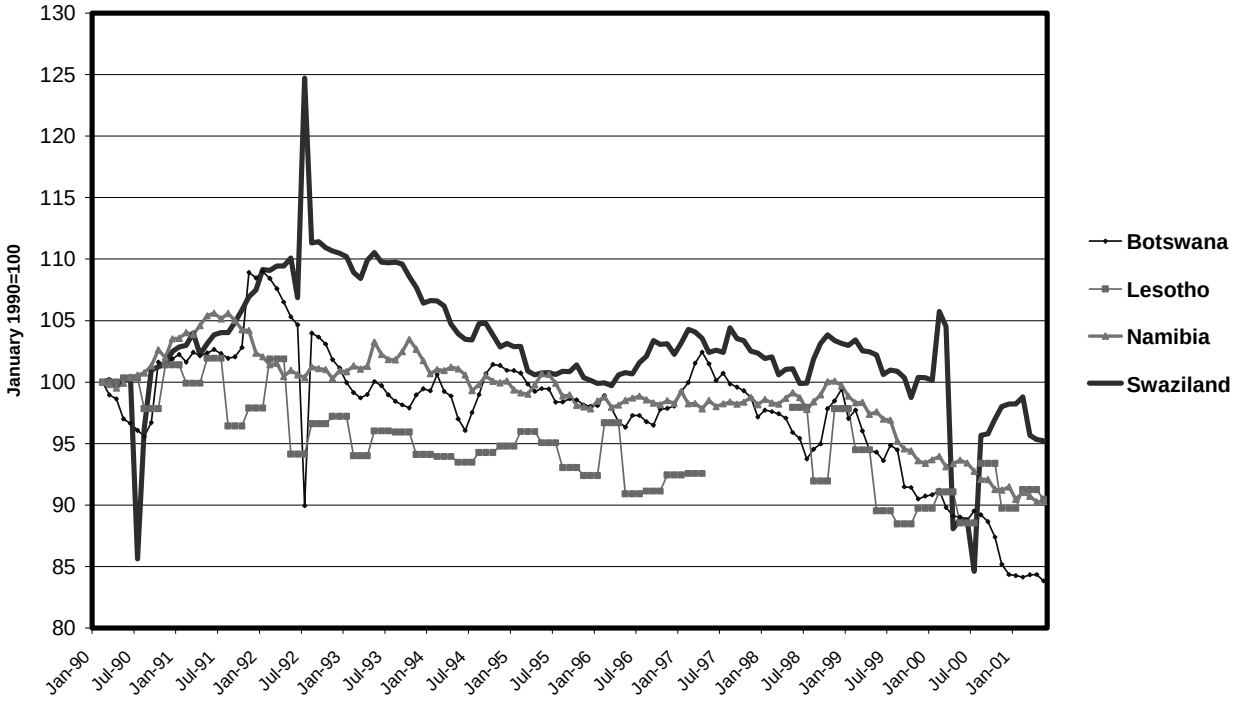
$e_{i,sa}$ is the bilateral nominal exchange of each country *i* against the rand;

P_{sa} is the domestic price level in South Africa;

P_i is the domestic price level of country *i*.

Chart 1 plots real exchange rates against the Rand, showing that they remained fairly stable until 1999, when the rand started to depreciate and inflation differentials failed to keep in line. Except for Botswana, whose basket peg regime has partly prevented some temporary real overvaluation, the other countries could not adjust nominal exchange rates and consequently experienced large pass-throughs owing to the high degree of openness and extreme import-dependence on South Africa.

Chart 1: Bilateral RER. CPI based



Source: see Appendix.

To test the applicability of the long-run relationship among all bilateral RER more rigorously, we apply the G-PPP approach (Enders and Hurn, 1994; Enders, 1995), so far tested for the East African Community case by Mkenda (2001). As mentioned above, G-PPP stands for Generalised Purchasing Power Parity, meaning that among a group of *n* countries there are *n-1* bilateral nominal exchange rates that are equal to their bilateral relative prices. For groups of countries with close ties or where economic fundamentals move in similar ways, all bilateral RERs should display common trends.

Before going into methodological details it is worth asking whether G-PPP is a good assumption in the case of the CMA and Botswana. We believe this is the case because: *a)* CMA countries are highly open economies (tradable goods represent as much as 70 per cent of consumer price index weights, see Charts 2 and 3 in Section III.2 below), *b)* the absence of tariff barriers given that all these countries form the South African Customs Union (SACU), and c) low transport costs given their close vicinity (natural partners).

Speaking in econometric terms, the G-PPP postulates that though bilateral real exchange rates are generally non-stationary, they will exhibit common stochastic trends if the fundamental variables (i.e. the forcing variables) are sufficiently interrelated[4]. Enders and Hurns (1994) add that G-PPP can be interpreted in terms of optimum currency areas. In the two-country case, the real exchange rate between the two countries comprising the domain of a currency area should be stationary. In a multi-country setting, within an appropriately defined currency area, the forcing variables will be sufficiently interrelated, so that the real exchange rates themselves will share common trends. Hence, within a currency area we would expect there be at least one linear combination of the various bilateral real exchange rates that is stationary.

Following G-PPP, suppose that *m* of the countries in an *n*-country world comprise the domain of a currency area; for these *m* countries — 5 in our case — there exists at least a long-run equilibrium relationship between the *m-1* bilateral real rates (4 here) such that:

$$RER_{12} = \beta_0 + \beta_{13} RER_{13} + \beta_{14} RER_{14} + \beta_{15} RER_{15} + e_t \qquad (1)$$

Or $e^*_t = \sum_{j=2}^{5} \beta^*_{1j} \, RER_{1j} - \beta^*_0$ where e^*_t is a stationary process, every β^*_{1j} is a β_{1j} coefficient normalised by β_{12} and each RER_{1i}, *i*= 2…5 stands for the respective bilateral rates of Botswana, Lesotho, Namibia and Swaziland (considering South Africa as the numéraire).

The next step consists of identifying and estimating the long-run relationship(s) implied by (1). Using Johansen's methodology — which assumes all bilateral RER are endogenous — we are able to find the number of cointegrating vectors and the point estimates β_{1j} [5]. The results confirm the cointegration hypothesis between the different

4. We are not able to disentangle, however, the part that is due to common policy responses, often seen in sub-regional integration processes where macroeconomic coordination is carried out.
5. First, we proceeded to check the stationarity of the variables, finding all of them to be I(1) or unit-root processes. Then we chose the optimal lag number in order to perform the Johansen test under the assumption of no deterministic trend in data (which seems reasonable in light of the data generation process shown in chart 1). Finally, we obtained the number of cointegrating vectors (2), confirming G-PPP holds. See annex A for further details about the econometric modelling and results.

bilateral real exchange rates. Therefore, these results put forward the significant RER co-movement, in turn supporting the case of some degree of common trends in real fundamentals. In other words, our finding shows that the RER in CMA countries and Botswana vary quite similarly, indicating that the underlying economic shocks or policy responses to them do not spark divergent relative price effects.

III.2. Accounting for OCA'S Costs and Benefits in a Panel "G-PPP" Approach

Deviations from/convergence to G-PPP can be a signal of different/similar macro-fundamental responses resulting from divergent/similar needs to smooth external shocks out. Testing for cointegration between bilateral RERs offers a proof of such divergence/convergence but does not necessarily provide an explanation of which factors might be driving different/similar adjustments in relative prices. Conversely, the criteria suggested by the theory of OCA lay out a useful framework to pin down these factors. This would certainly be the case should the degree of compliance with G-PPP be understood as evidence supporting the case of a common currency area. We maintain that given the fixed exchange rate arrangements in place (or quasifixed in Botswana), any diverging/converging fluctuations in domestic prices, CPIs, should be accounted for by OCA theoretical variables in either sense (for instance, different business cycles may require different relative price adjustment)[6].

In a nutshell, we are interested in explaining the magnitude and the significance of the determinants of G-PPP deviations in a panel framework. Instead of the standard deviation of the RER used by Bayoumi and Eichengreen (1996 and 1998), our dependent variable is the intra-annual linear correlation coefficients taking each possible pair of countries ($CORRELCPI_{ij}$)[7]. In our case, there are 10 combinations. We use that variable instead of the one proposed by Bayoumi and Eichengreen for three reasons. First, because $CORRELCPI_{ij}$ is a more accurate measure to compute the degree of deviation from G-PPP. Second, while the standard deviation of the RER is highly endogenous to some of the explanatory variables, e.g. to the bilateral trade intensities, the latter is poorly relevant in the CMA countries. Third, the linear correlation coefficient is independent of the scale of the variables. Indeed, a given level of this coefficient could be associated to different time series which display different standard deviations.

Positive correlations indicate that prices move in the same direction (perfect=1), favouring the G-PPP hypothesis. On the contrary, lower or negative correlations mean that domestic prices display dissimilar paths or are inversely correlated (=-1), which could be taken as evidence of a violation to G-PPP and the non-existence of an OCA.

We apply a monotonic transformation of this correlation in order to avoid violating the normality assumption requested for our panel estimations, due to the closed range of $CORRELCPI_{ij}$ (between -1 and 1). To circumvent this problem we apply the following transformation:

6. In other words, we want to identify the sources of strain that would ultimately push bilateral real parities away from its PPP levels, i.e. when inflation differentials widen or other factors are in operation. Therefore, it would be redundant to include the inflation differential on the RHS when ours is a measure related to it.
7. For example, CORRELCPI between Namibia and South Africa in 1996 results from calculating the linear correlation coefficient spanning January to December observations (12) for that year.

$$\text{CORRELCPI}_{ij}\,* = \log\left[\frac{(\text{CORRELCPI}_{ij}+1)}{1-\text{CORRELCPI}_{ij}}\right]$$

So that the new variable is continuous and now lies inside the interval $(-\infty,+\infty)$.

The explanatory variable set is derived from OCA theory[8]. These variables (and the expected signs of their associated coefficients in the equation where CORRELCPI_{ij} * is the dependent variable) are the following:

*1) The Degree of Openness (**OPEN** $_{ij}$(+)):*

Indeed, the more open an economy is, the larger the benefits of joining a currency union will be, *ceteris paribus* (Mc Kinnon, 1963). When non-tradable goods are a small share of total output, the nominal exchange rate ceases to be an effective instrument to restore equilibrium after a real shock occurs. This is so because of the size of the exchange rate change following such shock (fall in export demand or adverse terms of trade variation) that is required to shift resources away from the non-tradables sector to the tradables one. If prices and wages are sufficiently flexible or there is no money illusion, large devaluations will be automatically transmitted to production costs and consumer prices so the pursued real exchange rate effect will be virtually neutralised[9].

We measure the degree of openness as the mean of the logs of total trade in percentage of GDP for each pair of countries i,j[10]. In other words:

$$\text{OPEN}_{i,j} = \left[\frac{\log\left(\frac{\text{total trade}}{GDP}\right)_i + \log\left(\frac{\text{total trade}}{GDP}\right)_j}{2}\right]$$

All the five countries are highly open economies, either looking at trade flows in relation to GDP (Chart 2) or tradability in consumer price index (CPI, Chart 3). Hence, *the more open the countries are on average*, the less the need for different RER adjustments and *the more their CPIs should be correlated.*

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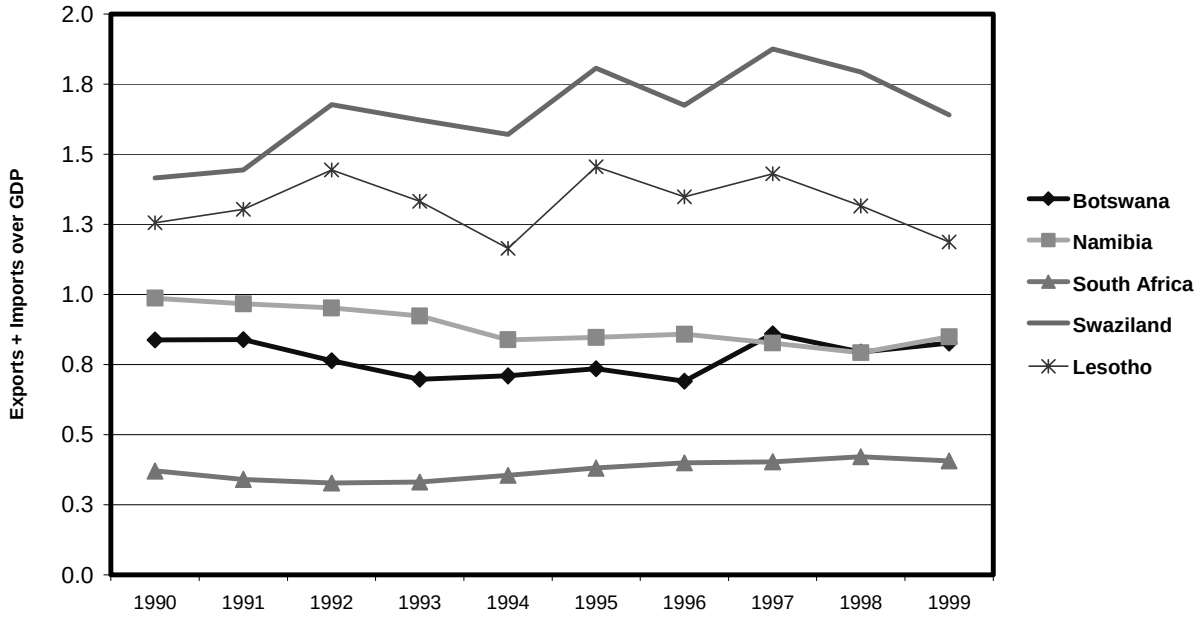
8. Good surveys of the OCA literature can be found in De Grauwe (1997), Laffrance and St-Amant (1999) or Kenen (2000), among others.

9. Corden (1972) argues the openness criterion applies only to microeconomic demand changes in the domestic economy and does not apply to macroeconomic disturbances that occur abroad. He argues to the extent the latter has been the primary cause of payments disequilibrium then the economy should be insulated by flexible exchange rates (specially so a large economy).

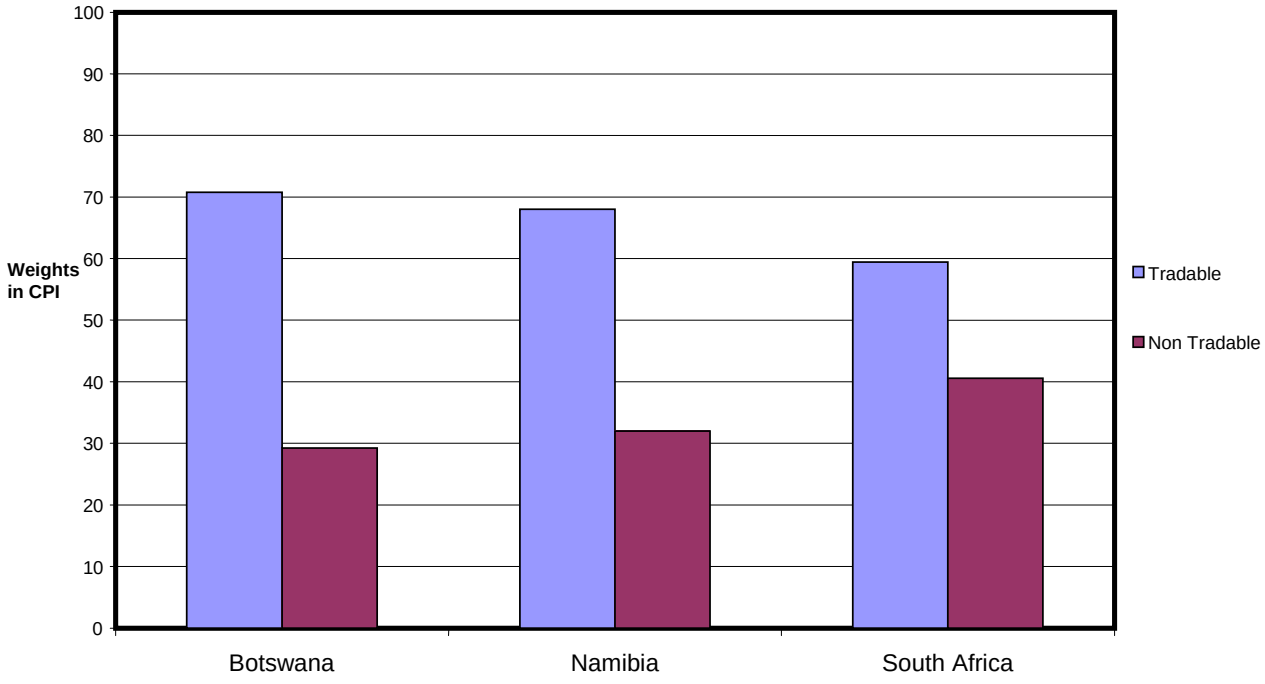
10. As we mentioned above, the bilateral trade intensities in the CMA are very low and do not increase significantly over time. Therefore, we took the total trade flows over GDP as an indicator of the degree of openness. Curiously, the relevant trade flows for member countries are other than intra-zone exchanges, with the exception of the imports from South Africa, which account up to a 90 per cent in some cases. However, the weights the export markets had in each country showed a relatively similar structure. In other words, the optimal trade-weights that would stabilise the REER for SACU as a whole should be (calculations made from IMF DOTS, 2000): 41.7 per cent in European currencies (predominantly the euro and sterling), 11 per cent in US dollar, 6.4 per cent in Japanese yens and the remaining 40 per cent in diverse Asian and African currencies.

Chart 2: The Degree of Openness in CMA and Bostwana 1990-2000



Source: see Appendix.

Chart 3. The Degree of Openness 2 (Tradability Analysis of CPI index)



Source: see Appendix.

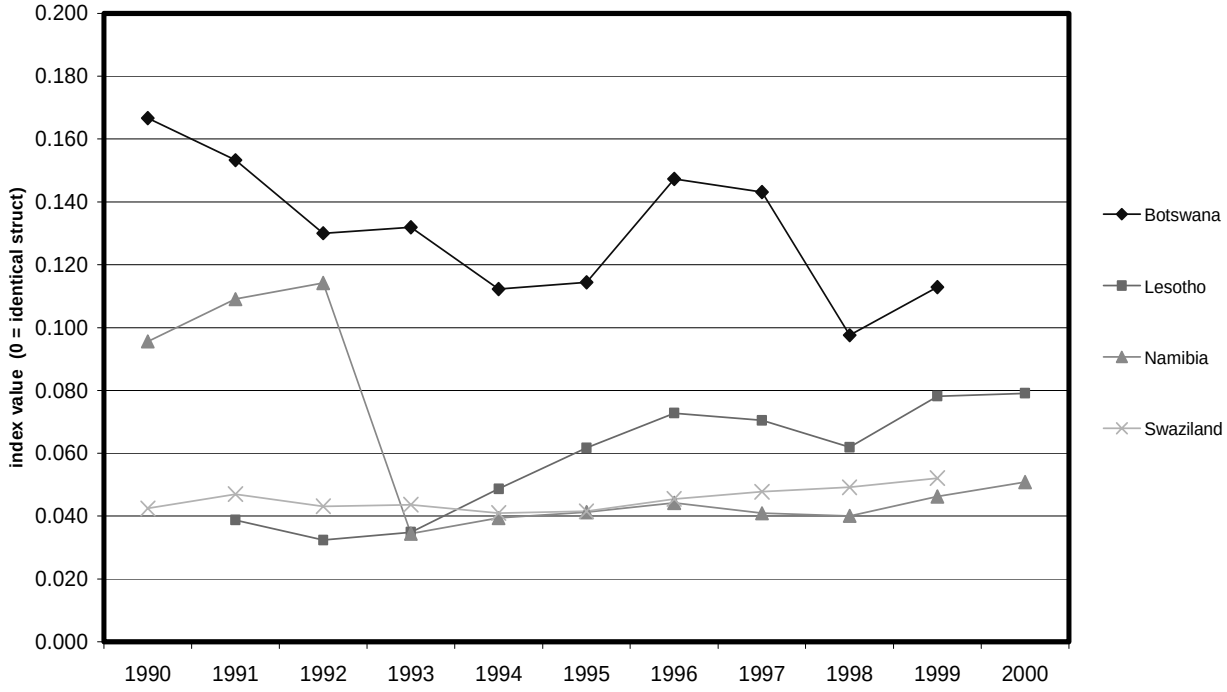
*2) Diversification of Production and Exports of Goods and Services (**HERFIN**$_{ij}$(-)):*

The production/export diversification argument was pointed out by Kenen (1969). The core of the argument is based on the idea that a larger production/export variety allows diversifying negative terms of trade shocks away (law of large numbers). Put differently, for a country producing a small variety of goods and exporting only a few of them, a decline in exports revenue would result in relatively higher labour unemployment (or higher idle capacity) than in a more diversified economy with a fixed exchange rate (provided both are open economies). We measure the relative diversification of production in a country i with respect to another country j across k producing sectors by the well-known Herfindhal index. The last is defined as the sum of the squared differences between sector k share in country i (s_{ik}) with respect to the same share in country j (s_{jk}). In other words:

$$H_{i,j,k}t = \sum_{k}(s_{ik} - s_{jk})^2$$

Given the data availability (lack of more disaggregated observations), we used one digit data from the standard international CIIU classification and computed the above indices for each pair of countries. For instance, Chart 4 depicts Herfindhal indices over 1990-2000 comparing the relative diversification of each country with respect to South Africa. The closer $H_{j,ZA,k}t$ is to zero, the more similar country j is compared to South Africa.

Chart 4: Herfindhal INDEX. Relative diversification with respect to South Africa 1990-2000



Source: see Appendix.

Moreover, regarding the export mix, the evidence shows that the countries have hardly diversified their export mix (table two below). All countries are largely dependent on a few commodities for the vast majority of their total exports: Namibia (gold, diamonds, fish), Botswana (diamonds, cooper, nickel and beef), Lesotho (textiles, crops), South Africa (gold, platinum) and Swaziland (sugar, textiles)

Table 2. **Export Diversification in CMA plus Botswana**

Country	Main Export Products	% of total exports	Year
Botswana	diamonds	84	2000
Lesotho	clothing/textiles	60	1999
Namibia	Diamonds/fish	48/30	2000
South Africa	Minerals (gold, platinum)	59	2000
Swaziland	Sugar cane or derivatives	40	2000

Source: Economist Intelligence Unit.

Therefore, the more similar and/or more diversified countries are relative to each other — *the lower* $HERFIN_{ij,k}t$- *the more their CPIs should be correlated.*

*3) Shock Asymmetry (**LOGOUPUT** $_{ij}$(-)):*

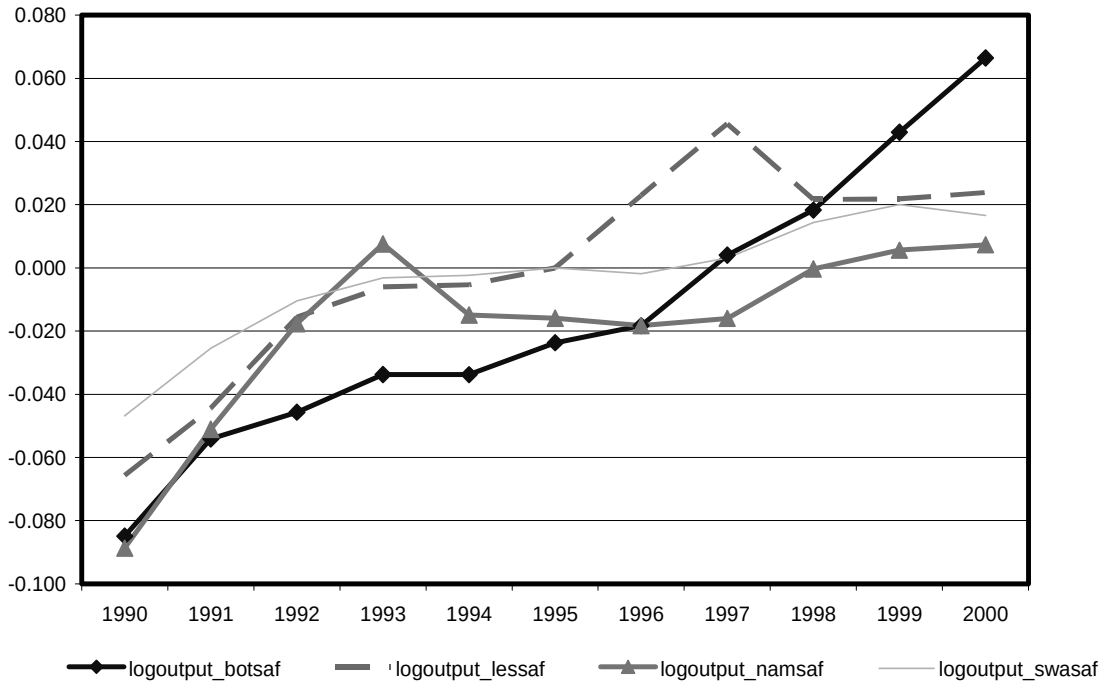
When enough wage flexibility and/or labour mobility is not assured in order to restore the internal and external equilibriums in the face of a real shock, exchange rate adjustment may turn out useful for policy makers in order to put the economy back into equilibrium. This issue was one of the main contributions made by Mundell (1961). In a world with two countries with no capital mobility, homogenous goods, etc, an expenditure-switching shock (demand shifts away from domestic products to foreign ones) requires real wages to fall or workers to migrate to the favoured country in order to restore goods, labour market and in consequence external balance equilibrium. Real wages start to rise in that country attenuating the positive competitiveness effect. If migration occurs, the migrants' additional consumption of goods imported from their country of origin will increase their relative price. The ultimate effect will be a reversal in trade balances. However, if real wages are sticky or labour immobile, thus hampering market clearing conditions, other transfer mechanisms should be put in place so as to smooth output fluctuations and restore external equilibrium.

We measure the degree of shock asymmetry by means of the log of the ratio between real output in country i and j (where each real output is normalised through an index set at 100=1995). That is:

$$LOGOUTPUT_{IJ} = Log\left(\frac{realGDP_i}{realGDP_j}\right)$$

Although it is impossible to disentangle shocks and policy responses through these figures, this indicator provides an approximation about how correlated economic cycles are. If both GDPs move together on a one on one basis, then the variation in LOGOUTPUT will be zero. Chart 5 shows that the all four countries display a high synchronicity with respect to South Africa, especially when we look at the 1993 recession and the 1999 slowdown in output performance (with the exception of Botswana)

Chart 5: Relative real GDPs in CMA countries 1990-2000



Therefore, monetary integration can be costly where real shocks tend to be asymmetric and labour markets rigid. As a consequence, we would expect *the less synchronised business cycles are the less (or more negatively) correlated domestic prices should be.*

*4) Capital mobility and the composition of gross capital inflows (**FDIGKI** $_{ij}$ (-)):*

The classic debate reaches its limits where capital flows take up a more relevant dimension in determining business cycles or even long-run growth.

In spite of having completely liberalised intra-zone capital accounts, a rather unidirectional process has been observed in CMA. As expected, South African banks or mining companies, sometimes multinationals, invest in peripheral countries. However, South African foreign assets/liabilities in its partners still account for a very low share in total stocks (see SARB Quarterly Bulletin, December 2002). This certainly helps to smooth consumption in recipient countries, hence allowing some risk sharing.

The breakdown of gross capital inflows can also play a role by inducing real exchange rate (RER) misalignments if such flows have different horizons and volatilities. Available figures confirm that the bulk of regional private inflows are received by South Africa (94 per cent, Table 3), most of them as equity or debt liabilities, though FDI is slowly gaining ground. This is not irrelevant because large portfolio inflows have been one of the major causes of the heightened rand volatility, which has in turn affected its neighbours' competitiveness. By contrast, FDI and official flows have explained the bulk of capital inflows in the other four countries over the last twelve years.

Therefore, while capital mobility is low and unidirectional, in spite of the provisions made by the CMA agreement, the geography and breakdown of extra-regional capital inflows points to further RER instability and/or misalignments. Thus, *countries with divergent patterns of capital inflows should bear different relative price adjustment in the short run, thus lower CPI correlation*. We measure this variable by the difference between the absolute values of each country's foreign direct investment (FDI) over its total gross capital inflows (GKI). Put differently:

$$FDIGKI_{ij} = \left| FDIGKI_{i} - FDIGKI_{j} \right|$$

Note we did not use total inflows or the total inflows over GDP because it could have been endogenous to $LOGOUPUT_{ij}$. To our knowledge, this is the first attempt to include the capital flow dimension in an OCA econometric setting.

Table 3. **Gross Private Capital Inflows 1990-2000**
($ million)

	Foreign direct investment	Derivatives	Other Liabilities	Portfolio Inflows Total	Bonds	Equity	Total	Country Share (%)
Botswana	158.7	2.4	0	0.5	0.5	0	161.6	0.2
Lesotho	1438	0	387.1	0	0	0	1 825.1	2.7
Namibia (90-98)	890.4	0	219.9	274.8	90.5	184.3	1 385.1	2.0
South Africa	9 455	79	3 269	50 610	18 365	32 245	63 413	93.7
Swaziland	604	0	291.3	1.2	0	0	896.5	1.3
All countries	12 546	81.4	4167.3	50 886.5	18 456	32 429.3	67 681	100.0
Flow type share (%)	18.5	0.1	6.2	75.2	27.3	47.9	100.0	

Source: see Appendix.

Interactive Variables:

*5) $OPEN_{ij}$ *HERFIN(+-):*

This is an interactive variable intended to capture the fact that larger economies can be as open as smaller ones — in relative terms — and that their degree of diversification can go either way, towards tradables or non-tradables. Higher price correlation is expected in cases where the economy is more diversified (lower HERFIN), and the more so towards the tradable sector (higher OPEN). But Kenen (1969) also points out some contradiction between the criteria of diversification and size. This happens provided that a more diversified economy (lower HERFIN) is normally a larger one, where non-tradables goods weigh more (lower OPEN) and so exchange rate policy

does as we saw before. In conclusion, *a monetary union would perhaps accrue higher benefits to more diversified economies where the need for flexible exchange rates would be less* (Kenen, 1969). Therefore, we would expect an ambiguous effect from this interactive variable on CPI correlation across countries.

In order to estimate the importance of each of the OCA variables identified before, we suggest an error component model sampling a panel of five countries, thus ten combinations of CPICORREL*, over the period 1990-2000. We use annual data. The model equation is as follows:

$$CORRELCPI_{ij}^{*} = \beta_0 + \beta_1 OPEN_{ij} + \beta_2 HERFIN_{ij,k} + \beta_3 LOGOUTPUT_{ij} + \beta_4 FDIGKI_{ij} + \beta_5 OPEN_{ij} * HERFIN_{ij,k} + v_{it} \quad (2)$$

Where $\mathbf{v_{it} = u_i + e_{it}}$ is the error component term (an individual random disturbance $\mathbf{u_i}$ plus an i.i.d. term) and the traditional Gauss-Markov assumptions are, in principle, valid. These assumptions are the following:

i) $E(\mathbf{e_{it}}) = E(u_i) = 0$

ii) $E(\mathbf{e_{it}^2}) = \sigma^2_e$

iii) $E(\mathbf{u_i^2}) = \sigma^2_u$

iv) $E(\mathbf{e_{it}}\,\mathbf{u_j}) = 0$ for all i, t and j.

v) $E(\mathbf{e_{it}}\,\mathbf{e_{js}}) = 0$ if $t \neq s$ or $i \neq j$

vi) $E(\mathbf{u_i}\,\mathbf{u_j}) = 0$ if $i \neq j$

Based on the specification suggested by equation (2), we run different regressions, each one regarding one particular kind of estimator. Then, we evaluate the quality and properties of these estimators in comparative perspective so as to finally be able to choose the best fit.

Following traditional panel econometric modelling, we first ask whether the existence of group effects is significant or not. This requires testing the goodness of the pooled-OLS regression against e.g. the fixed effects model or within estimator, assuming the group effects as parametric shifts in the regression function. A standard Wald-F test is performed, indicating we reject the null that there are no individual intercepts significantly different from the common intersection (last row in table 4). This result leads us to ask whether one may consider these group effects as fixed or random. Some authors (Mundlak, 1978) have considered this distinction is an erroneous interpretation and we should always treat these effects as random. According to Mundlak, the fixed effects model is simply analysed conditionally on the effects present in the observed sample (Green, 1995). Moreover, this model — fixed effects — might be viewed as applying only to the cross-sectional units in the study, not to the ones left out of the sample. The only exception would be the case when the cross-sectional units exhaust the sample. Indeed, this is our case given that all CMA countries are considered and all possible combinations of CPICORREL* are taken into account herewith. Unfortunately, our T is short enough to assume away both effects are indistinguishable because we know all observations. Therefore, if no substantial differences between both estimators

are found, that is if their goodness of fit and properties are as good, we will suppose no real differences regarding the treatment of the nature of the group effects in our model. However, we should slightly favour the error components or random effects-Feasible Generalised Least Squares (FGLS) estimation for reasons we will address below.

What comes out clear-cut from the random effects-FGLS estimator is the inefficient weight assigned by pooled-OLS to the between-units variation, in relation to the within or fixed effects estimator. Most of the point estimates (βs) yielded by the random effects-FGLS regression are closer to the within estimators than to the pooled-OLS ones. This is the case because FGLS puts less weight on the between variations than the latter. Nevertheless, there is still evidence favouring the error components model (random effects). A Breusch-Pagan test allows one to check whether the null that σ^2_u is equal to zero can be rejected. The results displayed in table 4 confirm the rejection of the null that no random effects on the cross-sectional units are present. Another indicator of the impossibility to reject the random effects model is the fact that σ^2_e is different from zero (=1 in our exercise). This makes the weights used by random effects-FGLS lower than in the extreme case where they are such that FGLS estimators coincide with those obtained by the fixed effects-within regression. It should be noted that random effects-FGLS estimators are robust to heteroskedasticity and serial correlation over time (E ($\mathbf{e}_{it}$ $\mathbf{e}_{js}$) = 0 if $t \neq s$).

Another way to test whether the random effects-FGLS estimators are superior to those obtained by the fixed effects-within model, is to perform the Haussman's test. Briefly, under the null of $E(X_{it}u_i)=0$, which implies exogenous regressors, both within and random effects estimators are consistent but only the latter is efficient. By contrast, under the alternative of $E(X_{it}u_i)\neq 0$ the random effects-FGLS estimators are inconsistent while the within hold consistent. The results of Haussman's test suggest the null can be convincingly accepted (table 4). In conclusion, the true, best, estimators would lie somewhere between the random effects and within model.

Another important issue, though, is the potential presence of cross-correlated residuals, provided some omitted variables can equally affect each correlation pair (think of regional shocks). In other words, a violation to the assumption E ($\mathbf{e}_{it}$ $\mathbf{e}_{js}$) = 0 if $i \neq j$) is likely to happen. We also test for this through a Breusch-Pagan Lagrange multiplier test. The rejection of the null of no cross-correlation in the OLS model, lead us to estimate a Seemingly Unrelated Regressors (SUR) model by Feasible Generalised Least Squares. SUR-FGLS, by jointly estimating the cross covariance matrix, allows correcting for the source of bias implied by the residual cross correlation. The SUR-FGLS specification also corrects for cross-section heteroskedasticity, very likely given the unbalanced nature of our panel. This specification is sometimes referred to as the Parks estimator. Even in small samples the unbiasedness property of the SUR estimator holds. Consistency and asymptotic efficiency are also guaranteed (see Baltagi, 1995 and Zellner, 1962).

In conclusion, SUR-FGLS yields the most accurate and significant estimates. The point estimates are notwithstanding closer in size to the within estimators, but are quite more significant. We comment on these results below (Table 4).

Table 4. **Panel Estimation Output: OCA Determinants and Price Correlations**

Total panel (unbalanced) observations: 99, 1990-2000
Dependent Variable: CORRELCPI?

	SUR-FGLS		Fixed effects (within)		Random Effects-FGLS		Pooled OLS	
Variable	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**	**Coefficient**	**t-Statistic**
C					4.08	8.37	3.59	12.52
OPEN3?	10.45	6.51	10.87	2.33	3.84	1.30	-0.41	-0.22
HERFIN?	-2.91	-2.57	-2.95	-0.75	0.99	0.43	2.85	1.92
LOGOUTPUT?	-5.24	-3.71	-5.76	-1.27	-8.05	-1.81	-9.98	-2.23
FDIGKI2?	-0.15	-6.25	-0.12	-1.12	-0.15	-1.31	-0.19	-1.43
OPEN3?*HERFIN?	-77.37	-13.19	-78.52	-3.88	-51.35	-2.85	-26.07	-2.22
Fixed Effects								
_BOTSAF--C	5.14		5.19		-0.29			
_LESSAF--C	5.36		5.41		0.23			
_NAMSAF--C	6.18		6.24		0.46			
_SWASAF--C	4.17		4.18		-0.51			
_LESBOT--C	5.57		5.61		0.24			
_NAMBOT--C	5.27		5.31		0.34			
_SWABOT--C	4.36		4.39		-0.45			
_NAMLES--C	5.42		5.42		0.28			
_SWALES--C	5.57		5.54		0.43			
_SWANAM--C	3.21		3.18		-0.68			
R-squared	0.44		0.44		0.37			
Adjusted R-squared	0.35		0.35		0.34			

Note: For all estimators except for SUR ones, White Heteroskedasticity-Consistent Standard Errors & Covariance terms are calculated
*,**,***, significant at 10, 5 and 1% respectively

	statistic x	**Probability = 1-F(x)**
Hausmann test	1.73	0.88
BP random effects test	294.07	0.00
BP cross-correlation test (w/r to OLS)	163.61	0.00
Pooled vs Group Effects	3.39	0.001

What does the Regression output Imply in Terms of OCA Cost/Benefits?

Although the dependent variable is written in logarithms, this is not the case for all of the explanatory variables. While in some cases the estimated coefficients can be read as elasticities (OPEN — mean of two logs — and LOGOUTPUT), the others should be read as semi-elasticities, i.e. the percentage change in the dependent variable given an absolute change in the explanatory variable. All regressors are highly statistically significant.

First, a 1 per cent increase in the average degree of openness increases CPI correlations by 10.45 per cent. Second, a 0.10 absolute difference in the bilateral Herfindhal index, that is one economy is about 10 per cent less concentrated with respect to the other, brings down CORRELCPI* by 0.29 per cent. Third, a real growth differential of about 0.01 (1 per cent), i.e. one country growing at 2 per cent and the other at 1 per cent annually drives price correlation down by 5.24 per cent. Fourth, a 0.10 absolute difference in the FDI shares in total gross capital inflows — that is one country receives relatively 10 per cent more in FDI — reduces that correlation by 0.015 per cent. Given those countries display substantially different long-term investment shares — particularly with respect to South Africa, as we saw above — the divergence in RER patterns becomes considerable especially in 1995-2000 when South Africa's portfolio liabilities increase dramatically. Finally, and this is the fifth point, we come up with a negative and significant coefficient regarding the interaction term. This is evidence that more open (higher OPEN) and more similarly diversified economies (lower HERFIN) may display more correlated relative prices.

IV. CONCLUSIONS

Our study has emphasised two aspects of the monetary integration process in Southern Africa in light of G-PPP theory: *1)* whether this monetary area (CMA plus Botswana) constitutes an optimal currency area in the classic sense — though still being a non fully-fledged agreement; and *2)* what the costs and benefits for its partners have been. A two step-econometric exercise helped us to give some answers to these questions.

Our econometric evidence suggests that CMA and Botswana form an OCA given the existence of common long-run trends in their bilateral real exchange rates. We also tested that in the case of CMA and Botswana the smoothness of the operation of the common currency area — measured by the degree of relative price correlation — depends on different of factors. These factors signal both advantages and disadvantages of joining a monetary union. On the one hand, the more open and more similarly diversified the economies are, the higher the benefits they will reap from having joined. On the other hand, the less synchronised their business cycles, and the more different the kind of capital inflows are, the higher the costs they will have to bear if internal capital mobility is low. Finally, there is also a positive joint effect from a higher degree of openness and similarly higher degrees of diversification.

In sum, further microeconomic efficiency gains can still be accrued if these countries go all the way to a fully-fledged monetary union. Macroeconomic convergence, more similar production structures, higher output correlation and risk-hedging possibilities since periphery countries are able to resort to South Africa's capital market and overdraft facilities at the Reserve Bank, are all features that pave the way to full monetary integration. Nonetheless, in attaining this goal they will face some difficulties, namely:

— A certain divergence in terms of trade shocks. This can put further strain on the smooth functioning of the common monetary area because countries facing dissimilar relative price variations would need different trade balance adjustments.

— In connection with the above point, the lack of export diversification may reinforce the divergent effects from terms of trade shocks, mostly given the small share of intraregional trade. In spite of this, many countries have been making efforts to diversify towards real and financial tradable services (ex: tourism, banking). Were the economies to diversify towards non-tradable goods, then the loss of exchange rate policy could be more significant. All in all, very high average tradability in the region would still make relinquishing this instrument worthwhile.

— The one-way direction of trade intra-CMA might also be an obstacle to the definitive adoption of the Rand as common currency, should export earnings be tied to different third currencies. However, as the shares that different export markets have are quite similar, in that they are mainly directed to UK, the EU or the US, pegging to a currency basket is a possibility not to be ruled out. This would be even worthier in view of the heightened volatility of the rand, in turn triggered by growing portfolio capital flows in South Africa.

Lastly, the predominance of inter-industrial trade patterns and the fact that total trade within the area has very modestly risen are in contrast with Rose (2000) finding that monetary integration boosts intra-zone trade flows. Future research needs to be done to explain the causes of this seeming paradox. The gains from CMA are to be sought in other than a trade boost and the dynamic benefits derived from this. Moreover, in view of the former, the endogeneity criteria, i.e. higher bilateral trade intensities may drive output correlation up and turn the production structures more similar, would make little sense in this special case.

A) ECONOMETRIC APPENDIX

A-1) ADF Tests: Adjusted Sample Method

Since the series are not stationary it was necessary to test whether or not they were integrated of the same order, and then to perform the cointegration test (Johansen version) to detect the number of cointegrating vectors, in case the former holds. Briefly, for each variable the Augmented Dickey Fuller (adjusted-sample) test was run testing the null hypothesis of non-stationarity and concluding that all variables were integrated of order one (I(1)).

ADF equation: $\Delta Y_t = \alpha + \gamma Y_{t-1} + \sum_{j=1}^{n} \Delta Y_{t-1} + \varepsilon_t$

$H_0: \gamma = 0$

Table A1. **ADF Test**

Variable	Optimal lags	$H_0: \gamma = 0; \tau$ value	Critical Value 5 per cent
RERSAF_BOT	1	-0.65	-2.8849
RERSAF_LES	6	-1.44	-2.8892
RERSAF_NAM	1	-0.05	-2.8849
RERSAF_SWA	1	-2.11	-2.8849

Therefore, we were not able to reject the null hypothesis of a unit root for any of these bilateral real exchange rate series.

A-2) Preliminary Steps to Specify the Johansen Cointegration Test

Before carrying out the cointegration test, the number of lags to be included in the model was specified. For that reason, the Akaike Information Criteria (AIC) was employed, though the Sims' Likelihood Ratio test was also done. According to AIC the optimal lag was one month.

Finally, the Johansen trace statistic identified the existence of 2 cointegrating vectors, assuming no linear trend in data (see Appendix A-3).

A-3) Cointegration and VECM Estimation

Johansen Test:

Given a group of non-stationary series — like the ones presented above, it may be interesting to determine whether the series are cointegrated, and if they are, to identify the cointegrating (long-run equilibrium) relationships. One of the possible methods to test for these relationships was developed by Johansen (1991, 1995). Johansen's method consists on testing the restrictions imposed by cointegration on the unrestricted VAR involving the series.

Consider a VAR of order p:

$$\mathbf{y}_t = \mathbf{A}_1 \mathbf{y}_{t-1} + \ldots + \mathbf{A}_p \mathbf{y}_{t-p} + \mathbf{B}\mathbf{x}_t + \boldsymbol{\varepsilon}_t$$

Where $\mathbf{y}_t$ is a k-vector of non-stationary endogenous I(1) variables, $\mathbf{x}_t$ is a d-vector of deterministic variables, and $\boldsymbol{\varepsilon}_t$ is a vector of innovations. We can rewrite the VAR as:

$$\Delta \mathbf{y}_t = \Pi \mathbf{y}_{t-1} + \mathbf{A}_j \sum_{i=1}^{p-1} \Gamma_i \Delta \mathbf{y}_{t-1} + \mathbf{B}\mathbf{x}_t + \boldsymbol{\varepsilon}_t$$

Where

$$.\Pi = \sum_{i=1}^{p} \mathbf{A}_{i\_} \mathbf{I}_1 \quad \text{and } \Gamma_i = — \sum_{j=i+1}^{p} \mathbf{A}_j$$

Granger's representation theorem asserts that if the coefficient matrix Π has reduced rank r<k, then there exist kr matrices α and β each with rank r such that $\Pi = \alpha\beta$ and $\beta'\mathbf{y}_t$ is stationary. R is the number of cointegrating relations (the cointegrating rank according to this method) and each column of β is the cointegrating vector[11]. The elements of α are known as the adjustment parameters in the vector error correction model, in response to a deviation from the equilibrium. Johansen's method is to estimate the Π matrix in an unrestricted form, then test whether the restrictions implied by the reduced rank of Π can be rejected or not.

How many cointegrating vectors would there be? If there are k endogenous variables, each of which has one unit root, there can be from zero to k-1 linearly independent, cointegrating relations. If there are no cointegrating relations, standard time series analysis such as the (unrestricted) VAR may be applied to the first-differences of the data. Since there are k separate integrated elements driving the series, levels of the series do not appear in the VAR in this case.

Conversely, if there is one cointegrating equation in the system, then a single linear combination of the levels of the endogenous series $\beta'\mathbf{y}_{t-1}$ should be added to each equation in the VAR. When multiplied by a coefficient for an equation, the resulting

11. The cointegrating vector is not identified unless we impose some arbitrary normalisation. The program used (Eviews) adopts the normalisation so that the r cointegrating relations are solved for the first r variables in the yt vector as a function of the remaining k-r variables.

term $\alpha\beta'\mathbf{y}_{t-1}$ is referred to as an error correction term. If there are additional cointegrating equations, each will contribute an additional error correction term involving a different linear combination of the levels of the series.

If there are exactly k cointegrating relations, none of the series has a unit root, and the VAR may be specified in terms of the levels of all of the series. Note that in some cases, the individual unit root tests will show that some of the series are integrated, but the Johansen tests show that the cointegrating rank is k. This contradiction may be the result of specification errors.

Once the optimal lag number is defined (Sims tests, Information criteria), and a choice on different deterministic trends paths for the data is made (here it was assumed no deterministic trend), it is necessary to compute the eigenvalues λ_i of the Π matrix. In this way, the number of distinct cointegrating vectors can be obtained by checking the significance of those characteristic roots. Moreover, the number of λ_i statistically different from zero will be exactly the number of cointegrating vectors.

Then, two tests can be performed, one based on a trace-statistic or another based on a "maximum" statistic. For this exercise only the first one was carried out, but the second can be easily computed leading to similar conclusions (there is however some scope for discrepancy, see Enders 1995).

The trace statistic test the null hypothesis that the number of distinct cointegrating vectors is less than or equal to r against a general alternative. The test is of the Log Likelihood Ratio type under the following statistic:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{n} \ln(1-\lambda_i)$$

Table A2 below displays the results concluding, at a 5 per cent, that there are at most 3 cointegrating vectors.

Table A2. **Johansen Trace Test**

Sample: 1990:01 2001:04
Included observations: 120
Test assumption: No deterministic trend in the data
Series: RERSAF_BOT RERSAF_LES RERSAF_NAM RERSAF_SWA
Lags interval: 1 to 1

Eigenvalue	Likelihood Ratio	5 per cent Critical Value	1 per cent Critical Value	Hypothesised No. of CE(s)
0.235721	68.18824	53.12	60.16	None **
0.141741	35.92957	34.91	41.07	At most 1 *
0.119207	17.58769	19.96	24.60	At most 2
0.019441	2.355837	9.24	12.97	At most 3

*(**) denotes rejection of the hypothesis at 5%(1%) significance level
L.R. test indicates 2 cointegrating equation(s) at 5% significance level

Unnormalised Cointegrating Coefficients:

RERSAF_BOT	RERSAF_LES	RERSAF_NAM	RERSAF_SWA	C
0.008038	-0.038117	0.029255	-0.013956	1.366745
-0.036900	-0.001554	0.050970	0.006412	-1.971923
-3.58E-05	-0.013222	-0.015374	0.017919	0.944936
0.002624	-0.002280	-0.002043	0.000555	0.013518

Normalised Cointegrating Coefficients: 1 Cointegrating Equation(s)

RERSAF_BOT	RERSAF_LES	RERSAF_NAM	RERSAF_SWA	C
1.000000	-4.742035	3.639530	-1.736266	170.0344
	(3.76297)	(3.87112)	(1.34059)	(120.442)
Log likelihood	-877.8548			

Normalised Cointegrating Coefficients: 2 Cointegrating Equation(s)

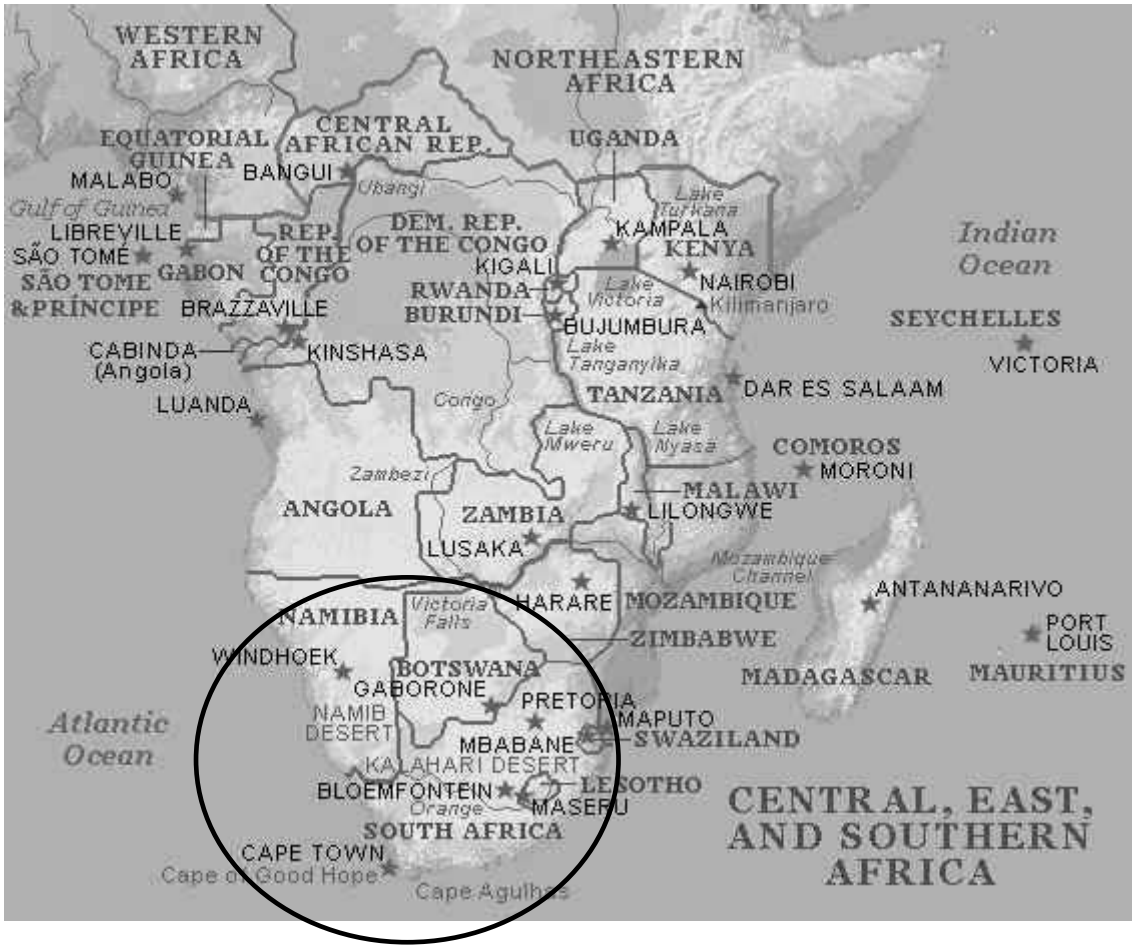
RERSAF_BOT	RERSAF_LES	RERSAF_NAM	RERSAF_SWA	C
1.000000	0.000000	-1.337120	-0.187523	54.46641
		(0.20684)	(0.14523)	(16.6904)
0.000000	1.000000	-1.049476	0.326599	-24.37097
		(0.15281)	(0.10730)	(12.3306)
Log likelihood	-868.6839			

Normalised Cointegrating Coefficients: 3 Cointegrating Equation(s)

RERSAF_BOT	RERSAF_LES	RERSAF_NAM	RERSAF_SWA	C
1.000000	0.000000	0.000000	-1.202081	25.95745
			(0.28785)	(29.6358)
0.000000	1.000000	0.000000	-0.469705	-46.74701
			(0.20695)	(21.3068)
0.000000	0.000000	1.000000	-0.758764	-21.32117
			(0.19599)	(20.1780)
Log likelihood	-861.0679			

B) COMMON MONETARY AREA AGREEMENT

(1986, Namibia signs in 1992)



Source: http://www.travelersdigest.com/southern_africa_map.htm.

Management of Gold and Foreign Exchange Reserves

The respective monetary authorities have responsibilities over the management of gold and foreign exchange reserves of the two countries. However, to enable the South African authorities to monitor the exchange control system of the CMA, each member state provides the South Africa Reserve Bank with a monthly statement reflecting the total balances of gold and foreign exchange, including rand held by the monetary authorities and authorised dealers in their respective areas.

Legal Tender

Article 2 establishes the Rand as legal tender for CMA, although there is provision for the LNS (Lesotho, Namibia and Swaziland) countries to introduce their national currencies, constituting legal tender only within their respective national borders. The rand is therefore the monetary standard for the CMA and any other national currencies must not only be pegged but must also be unconditionally convertible into rand.

Access to South African Money and Capital Markets

Articles 3 and 4 provide for the free flow of capital within the area. Both private and official capital flows are encouraged, provided such flows are neither disruptive to money and capital markets nor inconsistent with the management of domestic financial institutions. Further, governments and private companies of the contracting parties have access to the South African capital and money markets. In order to underwrite the monetary stability of the Area, the South African Reserve Bank acts as a lender of last resort to the monetary authorities of the LNS countries.

Gold and Foreign Exchange Transactions

Article 5 provides for South Africa's partner countries to have access to South Africa's foreign exchange markets.

Exchange Control

The exchange control provisions of the Government of South Africa's partner country shall in all material aspects be substantially in accord with the exchange provisions ruling in South Africa as amended from time to time.

Compensatory Payments

Article 6 establishes the formula for computing compensation payments for seignorage on the Rand currency circulating in South Africa's partner country. Seignorage is calculated as follows: $s = (2/3)*(I^{bond\ yield})*(cu^{R})$, where $I^{bond\ yield}$ represents annual yield on the most recently issued long-term South African government stock and cu^{R} an estimate of the volume of Rand in circulation in South Africa's partner country. The 2/3 is based on interest earned by a portfolio in the area, which is likely to contain both long-term and short-term assets with lower yields.

Transfer of Funds within the Joint Monetary Area

A contracting party shall not apply any restrictions on the transfer of funds (current and capital transactions) to or from the area of the contracting party. Restrictions can be only imposed in cases of investment or liquidity requirements that may from time to time be prescribed to domestic financial institutions, but such restrictions should not be discriminatory to any contracting party. Also the Government of South Africa's partner countries may introduce measures relating to the investment of funds in domestic securities, for the mobilisation of domestic resources in the interest of the development of its area. Members also have obligations to work together to avoid disruptive capital flows arising as a result of measures taken in one area.

DATA SOURCES

Abbreviations: AFDI (African Development Indicators, from World Bank); CBB (Central Bank of Botswana); CBN (Central Bank of Namibia); CSO (Central Statistical Office, Botswana); DS (Datastream); IFS (International Financial Statistics from IMF); Statass (Statistical Agency South Africa); WBDI (World Bank Development Indicators).

Variable	South Africa	Botswana	Namibia	Lesotho	Swaziland
Nominal ER	DS	DS	DS	DS	DS
CPI, inflation rates	DS	DS	DS	DS	DS
Tradables in CPI	Statass	CBB	CBN	n.a.	n.a.
Real GDP	DS	DS	DS	DS	DS
Nominal GDP	DS	DS	DS	DS	DS
Exports, Imports fob	DS	DS	DS	DS	DS
Sectoral GDP, CIIU	DS	DS	DS	DS	DS
Capital Flows	DS/IFS	DS/IFS	DS/IFS	DS/IFS	DS/IFS
External Debt	DS	DS	DS	DS	DS
Forex Reserves	DS/IFS	DS/IFS	DS/IFS	DS/IFS	DS/IFS
Nominal Wages	DS	CSO	n.a.	n.a.	n.a.
Current Account	DS	DS	DS	DS	DS
Terms of Trade	AFDI	AFDI	AFDI	AFDI	AFDI

n.a.: not available.

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