

Analysis of SADC inflation rates by means of Markov Chain Monte Carlo simulations with Gibbs Sampling

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Abstract

This study introduces a novel and a simple method of analysing macroeconomic convergence variables. It uses Markov Chain Monte Carlo integration methods combined with Gibbs sampling to analyse the behaviour of inflation rates in the Southern African Development Community (SADC) region. It finds that over the last decade of 2000–2009, the relative inflation differentials and inflation variabilities in the SADC increased with geographic dispersion. Of the countries that are geographically far from South Africa, only Tanzania's inflation rates seem to behave more like the Common Monetary Area countries. Secondly, with the exception of Seychelles, in the last half of the decade inflation variability has become similar and stable in the SADC. Thirdly, intra-decade analysis shows that some countries have experienced widening relative inflation differentials, while others experienced contracting relative inflation differentials. The last conclusion is that, within the SADC, there are countries whose behaviour of high inflation makes them outliers.

The main policy implication of the study is that, to speed up macroeconomic convergence, it may be necessary or convenient for the SADC countries to adopt a monetary framework that targets inflation directly. The first step would be to assess scientifically the monetary transmission mechanism of each SADC country and identify important channels, as each country has different economic endowments and a unique macroeconomic structure.

JEL classification: C11, C15, E31

Keywords: SADC inflation differentials, variability, Markov Chain Monte Carlo simulations, Gibbs sampling

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1 Introduction

The Southern African Development Community (SADC) was founded in 1992, replacing the Southern African Development Community Conference that was established in 1980 by the founding members Angola, Botswana, Lesotho, Mozambique, Swaziland, Tanzania and Zambia. Currently, additional members of the SADC are the Democratic Republic of Congo (DRC), Madagascar², Malawi, Mauritius, Namibia, Seychelles, South Africa (SA), Swaziland and Zimbabwe.

According to the website of the SADC, the mission of the SADC “is to promote sustainable and equitable economic growth and socio-economic development through efficient productive systems, deeper co-operation and integration, good governance, and durable peace and security, so that the region emerges as a competitive and effective player in international relations and the world economy”. In this context, SADC members are required to achieve, among other things, macroeconomic convergence, which includes low and stable consumer price inflation, avoiding highly volatile exchange rates, and other forms of economic imbalances. To achieve the goal of co-operation and integration, the SADC has set four quantitative macroeconomic convergence targets, namely, achieving low and stable annual consumer price inflation, maintaining a sustainable fiscal budget balance as a ratio of gross domestic product (GDP), maintaining a sustainable public-debt-to-GDP ratio, as well as maintaining a low ratio of the current account of the balance of payments to GDP. As far as inflation targets are concerned, the SADC has set a target of less than 5 per cent by 2012 and less than 3 per cent by 2018 (IFC Bulletin (2010)).

While the analysis of a set of variables to assess macroeconomic convergence is desirable and common, this study focuses on the SADC inflation rates to introduce a novel and a truly simple non-theoretical framework suitable for analysing a wide variety of macroeconomic convergence variables in the spirit of Burgess (2009). To the best of the authors’ knowledge, the framework introduced below has not been applied to analyse macroeconomic variables. The framework allows a researcher to

² Madagascar has been suspended from all SADC bodies and activities owing to the unconstitutional political ruling in March 2009.

make robust inferences when he or she is confronted with limited time series, with as little as 5 annual observations. When the researcher deals with limited data, he or she can choose between maximum entropy³ econometrics in the spirit of Golan, Judge, and Miller (1996) and Markov Chain Monte Carlo (MCMC) integration methods with Gibbs sampling as discussed in Ntzoufras (2009) or in Lancaster (2004). According to Jaynes (1982), maximum entropy formalism, a concept developed by Shannon (1948) as a measure of uncertainty in the context of information theory, is a special case in the application of Bayesian methods. Currently, in the field of Bayesian econometrics, MCMC integration methods with Gibbs sampling are considered superior because they use the likelihood function to treat all unknown parameters as random variables in order to capture all the information that is available in the sample so as to generate a density function that becomes the basis for robust inferences. Moreover, MCMC methods relying on the variants of Metropolis-Hastings algorithms are now computationally feasible, even when using as many as 6 to 10 million iterations.

In the context of regional integration and macroeconomic convergence, a detailed analysis of inflation is useful for the following reasons: In most countries in the SADC region, price stability is the primary objective of monetary policy. This requires the achievement of low and stable inflation in the medium to long term. Long-run price stability helps to anchor medium-to-long-term inflation expectations, thus reducing inflation uncertainty, which is generally detrimental to economic growth (See for example Fountas (2010), Fountas and Karanasos (2007), or Grier and Grier (2006). If the monetary policy framework fails, higher inflation and higher inflation uncertainty are inevitable. Higher inflation and higher inflation uncertainty have negative welfare effects on income and income distribution. In the regional context, inflation is one of the important indicators that is targeted and is monitored closely because it has welfare implications and it influences the behaviour of the monetary transmission mechanism.

In addition to the above-mentioned motivations, the analysis of SADC inflation rates is useful in that it gives an indication of the level of economic stability among countries

³ Maximum entropy principle states that when we make inferences based on incomplete or limited data we should draw them from the probability distribution that has maximum entropy permitted by the information available (Jaynes (1982)).

in the region. Historically, economic instability has had negative spillover effects both on the countries themselves and the region more broadly (SADC Secretariat, 2007). Hence, the most basic component of macroeconomic convergence is to achieve macroeconomic stability across the region through the achievement and maintenance of price stability in the medium to long term.

The rest of the paper is organised such that in section 2 a literature review of SADC inflation is undertaken. The methodology used is described in section 3. Section 4 discusses the empirical results and section 5 concludes.

2 Literature on the analysis of SADC inflation rates

The number of studies providing a detailed analysis of SADC inflation rates is limited. The main reason is that, when a researcher is faced with limited data, say five annual observations, standard time series econometric methods don't apply. In the case of SADC, reliance on panel data econometrics does not lead to robust inferences due to poolability problems. Moreover, panel data econometrics is useful when testing specific hypotheses. This study focuses on the historical realisations of the inflation rates. Hence, it uses the MCMC integration methods.

Recent studies that have analysed SADC inflation rates to test the stationarity properties of SADC inflation rates include Vishal (2010) and Mokoena, Gupta, and van Eyden (2009). These studies find mixed evidence concerning whether the statistical properties of monthly time series support macroeconomic convergence.

Without loss of generality, consider a situation whereby all SADC countries miss a specific inflation target over a rather long period. When analysing inflation in such a situation, it is better to benchmark the inflation rates of countries in the region with that of a best performing country. This is the approach used below.

3 Methodology and data analysis

In this paper we use annual data of the last decade (2000–2009) to assess the SADC inflation rates without pretending to know much about the member states' monetary policy frameworks. Based on ten observations per country, Markov Chain Monte Carlo (MCMC) integration combined with Gibbs sampling in the spirit of Geman and Geman (1984) are used to make proper and robust inferences. In this setting, the Metropolis-Hastings algorithm is combined with Gibbs steps to generate univariate conditional posterior distributions, leading to a flexible and efficient MCMC algorithm.

3.1 The strategy

The strategy used in the paper is simple. Firstly, we use South Africa's inflation rate as a benchmark, because the country has been successful in implementing the inflation-targeting framework for more than a decade. Secondly, we develop two statistics of interest. The first one is the relative inflation differential, denoted *diff* in equation [1], between South Africa and each of the SADC countries included in the sample. The second statistic of interest appearing in equation [2] is the ratio of the inflation standard deviations between an SADC country and South Africa. The analysis is carried out for three different periods of the 2000-2009 decade, when $t = 10$ in equations 1 and 2 below and the sub-periods are the first five years of 2000-2004 and the last five years of 2005-2009, when $t = 5$ for both periods.

$$diff = inflation(i) - inflation(SA) \quad \text{at time } t \quad [1]$$

$$ratio = \frac{inflation_stdev(i)}{inflation_stdev(SA)} \quad \text{at time } t \quad [2]$$

where $i \in (Botswana, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Sychelles, Swaziland, Tanzania, Zambia)$.

Due to lack of data and/or periods of severe macroeconomic instability, we have excluded Angola, the DRC and Zimbabwe.

3.2 A primer on Bayesian econometrics without equations

In statistics a model is recognised as Bayesian if a researcher exercises his or her beliefs regarding the parameters of interest and updates those beliefs by using Bayes Theorem, in the light of the data, to multiply the prior and the likelihood, so as to generate a posterior density function, which becomes the basis of inference and prediction. If the likelihood is defined properly, then the posterior exists in the range defined by the prior. The first step is, therefore, to properly define the likelihood function, because it is considered to capture all the information that is available in the data. The next step is to apply Bayes Theorem to generate the posterior distribution, which is considered to be a complete description of the parameter of interest. In this process, an algorithm is used to generate posterior distributions of the parameters of interest. To make proper inferences when the time series are short, MCMC simulations with Gibbs sampling are used in this paper to generate posterior distributions and posterior parameters of interest. This study relies on Metropolis-Hastings algorithm as discussed in Ntzoufras (2009).

3.3 Markov Chain Monte Carlo integration methods

The details of various MCMC algorithms can be found in Ntzoufras (2009) or in Lancaster (2004). It is important to mention that proper inference is achieved when the Markov Chain converges to a stationary posterior distribution, without the remaining autocorrelation. In the present study we undertook 1 million iterations and retained 700 001 iterations. So, the burn-in period is 300 000. To eliminate autocorrelation, the thinning interval was set at most to 2. The quintiles of interest are 2,5 per cent and 97,5 per cent.

3.4 The parameters of interest and the priors

The parameters of interest are the posterior mean and the posterior standard deviation of the statistics appearing in equations [1] and [2]. Of particular importance is to assess whether *diff* converges to 0. The convergence of the latter statistic to 0 means that the inflation rates between the two countries in point are similar and are therefore supportive of regional integration. Thus, an appropriate prior for *diff* is the normal distribution, because its mean is centred on zero. Convergence of *ratio* towards 1 implies that the inflation variances are similar between South Africa and another country within SADC and are therefore partly supportive of regional integration. Thus, a gamma distribution is appropriate as a prior, because it excludes zero and it is strictly positive. The initial values were set to a prior mean 0 for *diff* and prior precision 1 for *ratio*.

4 Data and empirical results

The data used were sourced from the International Monetary Fund database. SADC countries' relative inflation variability and differentials are based on the 2000-2009 decade. In order to assess the evolution of inflation rates, the 2000–2009 decade was divided into the first five and last five years. The results appear in Tables 1 and 2. The following inferences are made.

Botswana

In the last decade, Botswana's inflation variability was lower than that of South Africa. In terms of inflation differentials, average inflation was 2,8 percentage points higher than that of South Africa. However, in the first five years of the decade, the inflation rate in Botswana was higher by 1,8 percentage points relative to that of South Africa, while its inflation variability was much lower than that of South Africa. In the second half of the decade, Botswana's inflation was 3,8 percentage points higher than that of South Africa. However, inflation variability rose only marginally as compared to the first half of the decade, and was still below that of South Africa.

Lesotho

Lesotho's inflation was 1,4 percentage points higher than that of South Africa over the past decade, while inflation variability was virtually the same, with the ratio of variability approximately equal to 1. In the first half of the decade, inflation in Lesotho was 2,4 percentage points above that of South Africa. The inflation differential between these two countries declined in the second half of the decade. This implies that the management of inflation has improved in the second half of the decade. Lesotho's inflation variability was 1,2 times in the first half of the decade and rose to 1,8 times in the latter half as compared to South Africa. The latter increase could be attributable to the rise in imported inflation due sharp rise in food and energy prices during the period.

Table 1 Inflation differentials between SA and SADC countries

	Period	Posterior mean	Standard deviation	MC errors	2.5% quantile	97.5% quantile
Botswana	2000–2009	2.78	1.23	0.0015	0.34	5.23
	2000–2004	1.80	1.18	0.0014	-0.52	4.18
	2005–2009	3.81	2.75	0.0034	-1.63	9.38
Lesotho	2000–2009	1.42	1.38	0.0017	-1.31	4.16
	2000–2004	2.39	2.46	0.0030	-2.57	7.27
	2005–2009	1.62	2.77	0.0034	-3.81	7.29
Madagascar	2000–2009	4.2	2.14	0.0026	-0.14	8.36
	2000–2004	1.94	3.84	0.0049	-6.49	9.02
	2005–2009	5.62	3.26	0.0041	-1.08	11.96
Malawi	2000–2009	8.01	2.91	0.0037	1.95	13.5
	2000–2004	8.63	5.57	0.0088	-4.64	17.68
	2005–2009	5.07	3.10	0.0039	-1.26	11.19
Mauritius	2000–2009	0.48	1.26	0.0013	-2.01	2.10
	2000–2004	-0.85	1.31	0.0016	-3.44	1.79
	2005–2009	1.92	2.68	0.0033	-3.36	7.40
Mozambique	2000–2009	4.47	1.75	0.0021	0.95	7.91
	2000–2004	3.85	3.24	0.0042	-3.28	9.74

	2005–2009	4.50	2.85	0.0035	-1.20	10.23
Namibia	2000–2009	1.48	1.44	0.0018	-1.38	4.33
	2000–2004	2.68	2.79	0.0034	-2.84	8.33
	2005–2009	1.08	2.91	0.0052	-4.72	6.97
Seychelles	2000–2009	-0.04	3.74	0.0046	-7.69	7.19
	2000–2004	-1.89	1.90	0.0023	-5.72	1.86
	2005–2009	0.16	6.78	0.0085	-13.99	12.96
Swaziland	2000–2009	1.48	1.47	0.0018	-1.43	4.40
	2000–2004	1.60	1.69	0.0002	-1.82	4.91
	2005–2009	1.27	3.18	0.0039	-5.13	7.62
Tanzania	2000–2009	0.45	1.42	0.0017	-2.36	3.26
	2000–2004	-1.64	1.05	0.0013	-3.66	0.50
	2005–2009	2.62	2.88	0.0035	-3.13	8.44
Zambia	2000–2009	10.75	2.27	0.0029	6.07	15.07
	2000–2004	14.97	2.29	0.0036	9.96	18.84
	2005–2009	6.86	3.12	0.0040	0.46	12.97

Table 2 Inflation volatility ratios between SA and SADC countries

	Period	Posterior mean	Standard deviation	MC errors	2.5% quantile	97.5% quantile
Botswana	2000–2009	0.74	0.27	0.000036	0.35	1.39
	2000–2004	0.68	0.45	0.000070	0.19	1.80
	2005–2009	0.79	0.51	0.000078	0.22	2.06
Lesotho	2000–2009	0.99	0.36	0.000048	0.46	1.86
	2000–2004	1.16	0.75	0.001131	0.33	3.04
	2005–2009	0.81	0.52	0.000079	0.23	2.12
Madagascar	2000–2009	2.01	0.74	0.000098	0.94	3.79
	2000–2004	4.76	2.98	0.004353	1.33	12.27
	2005–2009	1.19	0.77	0.001174	0.33	3.12
Malawi	2000–2009	2.94	1.08	0.001451	1.38	5.55
	2000–2004	6.87	4.60	0.007253	1.84	18.57
	2005–2009	1.08	0.70	0.001063	0.30	2.83
Mauritius	2000–2009	0.80	0.29	0.000033	0.38	1.51
	2000–2004	0.95	0.62	0.000095	0.26	2.48

	2005–2009	0.73	0.47	0.000072	0.21	1.92
Mozambique	2000–2009	1.52	0.56	0.000074	0.71	2.86
	2000–2004	3.74	2.39	0.003599	1.04	9.77
	2005–2009	0.88	0.57	0.000087	0.25	2.30
Namibia	2000–2009	1.08	0.40	0.000053	0.51	2.03
	2000–2004	0.83	0.53	0.000081	0.23	2.17
	2005–2009	0.94	0.60	0.001060	0.26	2.45
Seychelles	2000–2009	4.11	1.49	0.001951	1.94	7.70
	2000–2004	1.88	1.21	0.001822	0.52	4.91
	2005–2009	4.58	2.72	0.003695	1.33	11.40
Swaziland	2000–2009	1.13	0.41	0.000055	0.53	2.12
	2000–2004	1.55	1.01	0.001546	0.43	4.07
	2005–2009	1.16	0.74	0.001096	0.33	3.02
Tanzania	2000–2009	1.05	0.38	0.000051	0.49	1.97
	2000–2004	0.26	0.17	0.000027	0.07	0.62
	2005–2009	0.91	0.59	0.000089	0.26	2.39
Zambia	2000–2009	2.15	0.79	0.001066	1.00	4.06
	2000–2004	2.12	1.52	0.0026920	0.57	5.82
	2005–2009	1.08	0.70	0.0010890	0.30	2.84

Madagascar

Inflation in Madagascar was 4,2 percentage points above that of South Africa, while the ratio of variability was twice that of South Africa for the 2000–2009 decade. This means Madagascar's inflation was highly volatile relative to South Africa's. In the first five years of the decade, Madagascar's inflation was 1,9 percentage points higher than that of South Africa. However, in the second half of the decade, the differential rose by 5,62 percentage points relative to South Africa. This could be attributable to high imported inflation associated with global increases in food and energy prices during the period. In the last five years, Madagascar's ratio of inflation variability was 4,8 times that of South Africa. In the last 5 years of the decade the ratio was closely similar to that of South Africa at 1,19. This implies that inflation volatility has improved.

Malawi

In the 2000–2009 decade, inflation in Malawi was 8,0 percentage points above that of South Africa. The ratio of inflation variability during the period was 2,9 times that of South Africa. In the first five years of the decade, inflation in Malawi was 8,6 percentage points higher than that of South Africa. However, in the last five years of the decade, inflation differences between the two countries diminished, when Malawi inflation recorded 5,1 percentage points above that of South Africa. The ratio of inflation variability in Malawi was 6,9 times that of South Africa in the first 5 years of the decade, while the ratio of variability was exactly the same as that of South Africa in the last five years of the decade. This shows that the volatility of Malawi's inflation has improved considerably.

Mauritius

For the whole decade, Mauritius' inflation was virtually the same as that of South Africa with a negligible differential of 0,5 percentage points, while the ratio of variability was stable. Mauritius was the only country that outperformed South Africa in terms of inflation levels and inflation variability in the first five years of the decade. In the last five years of the decade, the inflation differential between South Africa and Mauritius rose to 1,92 percentage points. However, the ratio of variability declined during the same period. This is evidence of strong macroeconomic convergence.

Mozambique

The differential in inflation between Mozambique and South Africa was 4,5 percentage points in past decade. In the first and last five years of the decade the inflation differentials of 3,9 and 4,5 percentage points were recorded. The ratio of the inflation variability for the whole decade was 1,5 times that of South Africa. In the first five years of the decade, the ratio of variability was 3,7 times that of South Africa, and in the last five years the ratio was below that of South Africa at 0,9.

Namibia

Namibia's inflation variability was similar to that of South Africa in the past decade (based on the thinning interval of 2). Namibia's inflation rate was 1,5 percentage points higher than that of South Africa. In the first five years of the decade, Namibia's inflation rate was 2,7 percentage points higher than that of South Africa, while the inflation variability was below that of South Africa. In the last five years of the decade, inflation in Namibia was only 1 percentage point above that of South Africa, while inflation variability was less than that of South Africa. Between the first five years and the last five years of the decade, the differential and variability in Namibia's consumer inflation declined.

Seychelles

Inflation in Seychelles was relatively lower than that of South Africa for the whole decade, while the ratio of inflation variability was 4,1 times that of South Africa. During the first five years of the decade, inflation in Seychelles was still below that of South Africa, and became exactly the same in the last five years of the decade. Inflation variability was 1,8 times that of South Africa in the first half of the decade, and substantially rose to 4,6 times that of South Africa in the latter half of the decade.

Swaziland

Inflation in Swaziland was 1,5 percentage points higher than that of South Africa during the past decade. However, the country's inflation variability was approximately similar to that of South Africa. For instance, the median of the ratio of variability between South Africa and Swaziland was only 1,13. In the first five years of the decade, Swaziland's inflation was 1,6 percentage points higher than that of South Africa. Swaziland's inflation variability was 1,6 times that of South Africa. A comparison of the first and second halves of the decade shows that Swaziland's inflation variability declined from 1,6 times to 1,2.

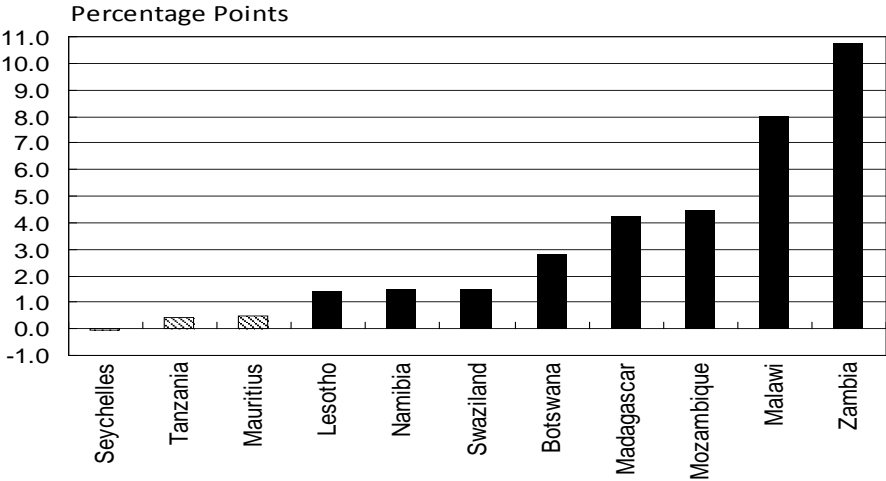
Tanzania

Inflation in Tanzania was 0,5 percentage points above that of South Africa during the past decade, while the ratio of inflation variability was exactly the same. In the first five years of the decade, inflation in Tanzania was lower by 1,6 percentage points as compared to that of South Africa. Moreover, the inflation variability was also much lower than that of South Africa. However, in the last five years of the decade, inflation in Tanzania was 2,6 percentage points above that of South Africa, while the ratio of inflation variability was exactly the same as in South Africa.

Zambia

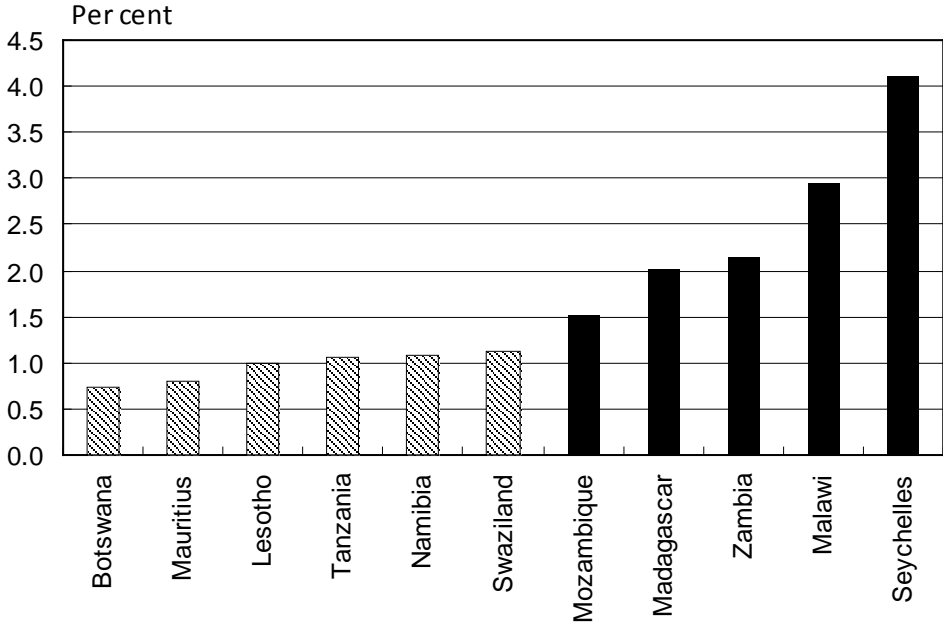
Zambia tops all SADC countries with a substantially larger inflation differential relative to South Africa as a benchmark. In the 2000–2009 decade, inflation in Zambia was 10,8 percentage points above that of South Africa. The ratio of inflation variability during the decade was 2,2 times that of South Africa. In the first five years of the decade the inflation differential was even higher at 15 percentage points relative to South Africa. However, in the last five years of the decade, inflation in Zambia was 6,9 percentage points above that of South Africa. Inflation variability in Zambia was 2,1 times that of South Africa in the first 5 years of the decade, while the ratio of inflation variability was similar to that of South Africa in the last five years of the decade.

Figure 1 Inflation differentials between SA and SADC countries (2000–2009)



Note: The light downward diagonal bars in figure 1 denote countries with closely similar inflation as compared to South Africa.

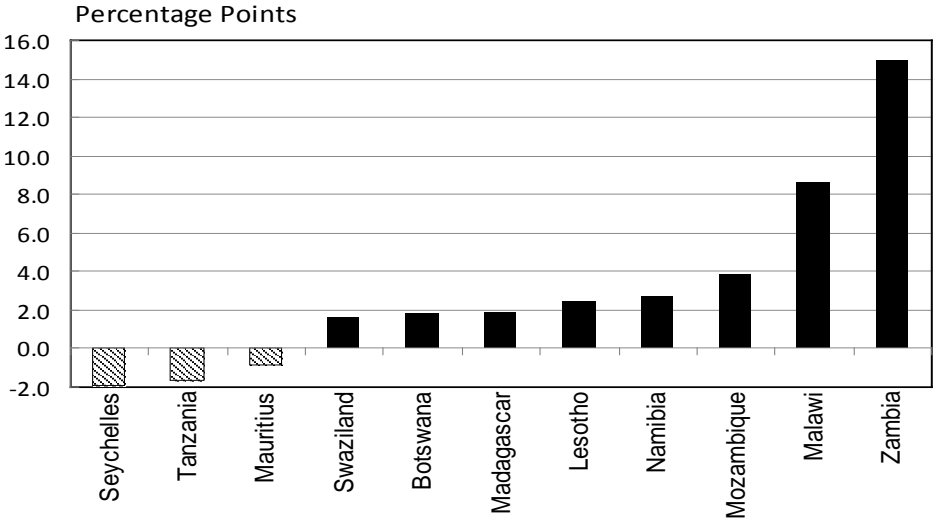
Figure 2 Inflation variability ratios: SA and SADC countries (2000–2009)



Note: The light downward diagonal bars in figure 2 denote countries that outperformed or have similar inflation variability to South Africa.

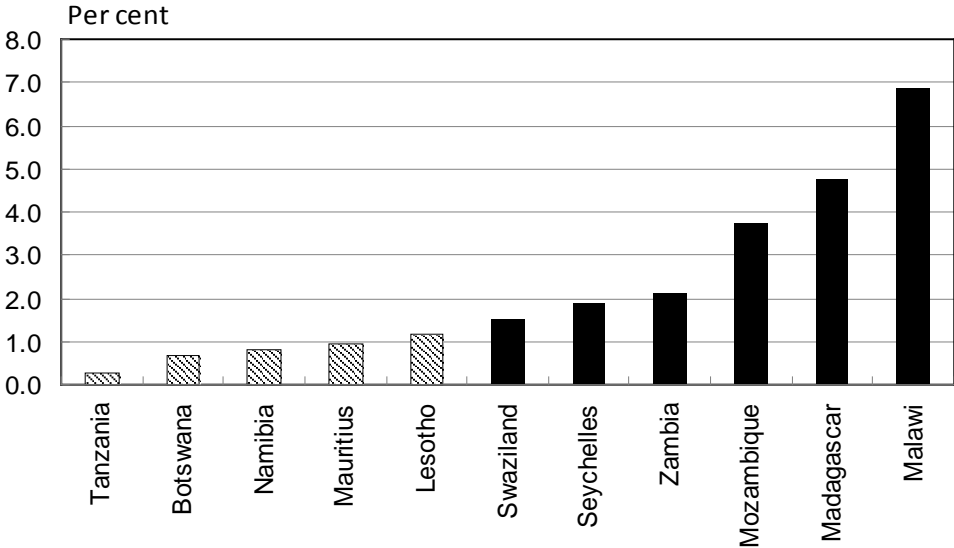
When one assesses the inflation differentials and the ratios of inflation variability in the SADC region, it becomes clear that the relative inflation differentials and inflation variances increased significantly with geography during the 2000–2009 decade (Figures 1 and 2). Of the countries that are geographically far from South Africa, only Tanzania seems to behave more like a CMA country.

Figure 3 Inflation differentials between SA and SADC countries (2000–2004)



Note: The light downward diagonal bars in figure 3 denote countries with closely similar inflation as compared to South Africa.

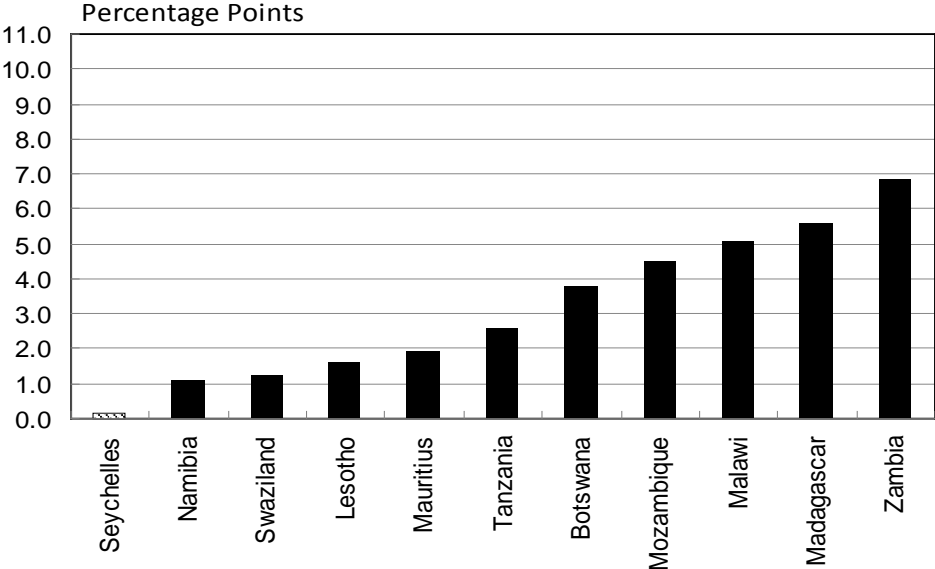
Figure 4 Inflation variability ratios between SA and SADC countries (2000–2004)



Note: The light downward diagonal bars in figure 4 denote countries that outperformed or have similar inflation variability to South Africa.

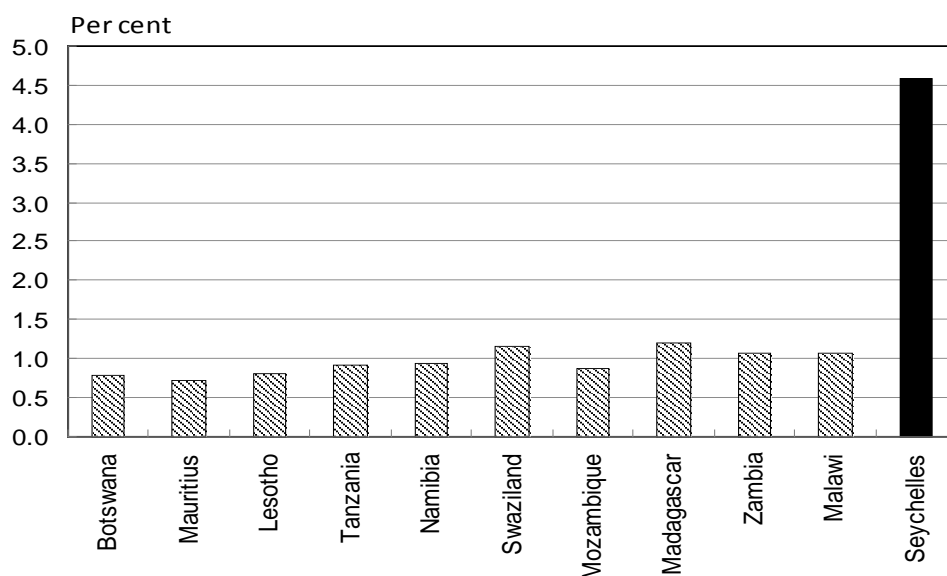
In the first five years of the 2000–2009 decade inflation rates of Seychelles, Tanzania and Mauritius were lower than South Africa’s inflation rate. In addition, in the same period, the relative inflation rates of Malawi and Zambia were clear outliers in that they were at least 8 percentage points higher than South Africa’s inflation rate. In the same period the relative inflation volatility of Tanzania, Botswana, Mauritius, and the CMA countries were stable and similar (See Figures 3 and 4).

Figure 5 Inflation differentials: SA and SADC countries (2005–2009)



Note: The light downward diagonal bars in figure 5 denote countries with closely similar inflation as compared to South Africa.

Figure 6 Inflation variability ratios: SA and SADC countries (2005–2009)



Note: The light downward diagonal bars in figure 6 denote countries that outperformed or have similar inflation variability to South Africa.

In the last five years of the last decade, relative inflation variability has declined in 10 out of a total of 11 countries examined. In particular, Botswana, Mauritius, Lesotho, Tanzania and Namibia have all outperformed South Africa in terms of relative inflation variability. Seychelles is an outlier in that its inflation variability is 4,6 times that of South Africa (Figures 5 and 6).

Table 3 Intra-decade assessment of inflation differentials and variability (2005–2009 minus 2000–2004)

	differentials	Comment on average inflation	Variability ratios	Comment on variability
Botswana	2.01	worsened	0.11	more-or--less similar
Lesotho	-0.77	improved	-0.35	improved
Madagascar	3.68	worsened	-3.57	improved
Malawi	-3.56	improved	-5.79	improved
Mauritius	2.77	worsened	-0.22	improved
Mozambique	0.65	worsened	-2.86	improved
Namibia	-1.60	improved	0.11	more-or- less similar
Seychelles	2.05	worsened	2.70	worsened
Swaziland	-0.33	improved	-0.39	improved
Tanzania	4.26	worsened	0.65	more-or--less similar
Zambia	-8.11	improved	-1.04	improved

When intra-decade analysis of inflation performance is undertaken, it is seen that the relative inflation differential of Zambia has declined by more than 8 percentage points. This is the largest improvement in the SADC. In the first half of the decade, average inflation differential between South Africa and Zambia was 14,97 and in the second half of the decade it declined to 6,86. Other countries that have experienced contracting relative inflation differential outcomes are Malawi, Namibia, Lesotho and Swaziland in that order (Table 3).

Countries that experienced widening relative inflation differentials in the second half of the decade were Tanzania, Madagascar, Mauritius, Seychelles and Botswana. Out of 11 SADC countries, 5 countries have shown improvements in relative inflation differentials.

In terms of the ratios of relative inflation volatility, countries that have managed to reduce relative inflation variability between the first and the second half of the decade are Malawi, Madagascar, Mozambique and Zambia. Out of 11 SADC countries, 7 countries have shown improvements in relative inflation volatility between the first and the second half of the decade (Table 3).

5 Conclusions

This study has established that, over the past decade, the relative inflation differentials and relative inflation volatilities in the SADC increased with geographical dispersion. Seychelles outperformed South Africa in terms of inflation differentials, while inflation in Tanzania and Mauritius was similar to that of South Africa. The relative inflation differentials of the CMA countries and Botswana are around two percentage points. The ratios of inflation variability of Botswana, Mauritius, Tanzania, and the CMA countries are lower than or close to 1, implying that their relative inflation variability is similar and stable. The ratios of inflation variability for Mozambique, Madagascar, Malawi, Zambia and Seychelles are between 1,5 times and 4,2 times higher than that of South Africa.

From a policy point of view, we cannot avoid the conclusion that there has been a significant improvement in the management of inflation in the SADC, especially in the past five years. The second conclusion is that some countries experienced widening relative inflation differentials, while others experienced contracting relative inflation differentials, a phenomenon not supportive of macroeconomic convergence. The last conclusion is that, within the SADC, there are countries whose behaviour of inflation makes them outliers.

The main policy implication of the study is that, to speed up macroeconomic convergence, it may be necessary or convenient for the SADC countries to adopt a monetary framework that targets inflation directly. The first step would be to assess scientifically the monetary transmission mechanism of each SADC country and identify important channels, as each country has different economic endowments and a unique macroeconomic structure.

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Appendix 1 (Raw Data)

Comparisons of average consumer prices (percent change) in the SADC region

