SLOW GROWTH IN SOUTH AFRICA: SPILL-OVERS TO OTHER CMA COUNTRIES

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Abstract

The paper investigates the spill-over effects of South Africa's economic growth on the Common Monetary Area (CMA). It uses simple correlation analysis and panel data econometric techniques (Fixed Effects, Generalised Methods of Moments and Panel Vector Autoregression). The findings reveal that even though South Africa is closely linked with the Lesotho, Namibia and Swaziland (LNS) countries through trade, financial and institutional linkages, economic growth in South Africa does not appear to have a significant spill-over effects on the CMA. However, a simple correlation analysis shows that there is indeed a statistically significant positive relationship between economic growth in South Africa and economic growth in the CMA region, implying that a slowdown in SA economic growth is likely to have negative implications on the CMA.

Keywords: CMA, South Africa, Economic Growth, Spill-overs.

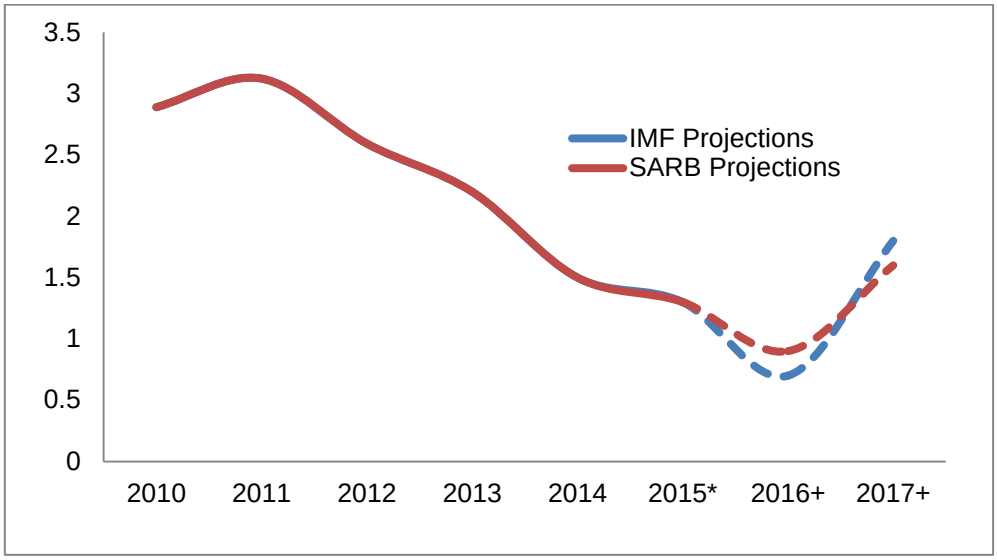
JEL Classification: C13, C33, C36, E60, O41, O47.

1.1 Introduction

Increasing economic integration among countries warrants increased exposure to shocks, either negative or positive. On the positive side, countries benefit from trading with fast-growing and relatively rich countries whereas on the negative side countries are affected detrimentally when trading with countries that are in recession and relatively poor (Arora & Vamvakidis, 2005). The magnitude of the spill-over effects depends largely on the degree of openness of the trading partners. A general conclusion from literature is that trade openness has a positive impact on growth (Baldwin, 2003). Given the fact that SA is relatively more advanced in terms of technological infrastructure, additional spill-overs could also be through technology transfers. Furthermore, SA's foreign direct and portfolio investment plays a significant role in the capital flows of some African countries. Moreover, SA plays a significant role in multi-country political and economic initiatives; therefore developments in SA could influence business and consumer confidence in the other African countries. These imply that developments in one country can spill-over to other countries through three main channels: trade linkages, financial linkages and institutional linkages (IMF, 2016).

In the Sub Saharan Africa (SSA), South Africa (SA) is the second largest economy (following Nigeria – after rebasing its GDP figures in 2013) accounting for approximately 21 per cent of SSA's Gross Domestic Product (GDP) [Hanson and Kambou, 2016]. The relatively large economic size of SA and its growing linkages with other African economies suggest that SA economic growth could have a significant influence on the rest of Africa (Arora and Vamvakidis, 2005). As such, SA is an important export destination for its neighbouring countries such as Lesotho, Namibia and Swaziland. However, it is worth noting that, needless to say, much of trade in the SSA takes place with countries outside the region. Advanced Economies and Emerging Markets Economies remain the largest destinations of SSA's exports. For instance, Lesotho trades significantly with the United States (US) in terms of textiles and clothing under the Africa's Growth and Opportunities Act (AGOA) provision.

Figure 1: South African Real Economic Growth Rate
(Annual Percentage Changes)



Source: IMF (2016) and SARB (2016)

Figure 1 depicts that in recent years, SA economic growth has been on a downward trajectory due to difficult global economic and financial environment (e.g. slow growth in major trading partners such as China and the European Union), coupled with domestic constraints such as electricity shortages, drought conditions and labour disputes, among other things. A common view in Africa is that SA is an engine of growth in the entire African continent and Africa's output is envisaged to be closely correlated with movements in SA. Based on this premise, a slowdown in SA's economic growth is likely to retard growth performance in the LNS countries due to the close linkages[1]. The quantitative assessment of just how much SA growth matters for the LNS countries has not been investigated in literature. Hence the objective of the paper is to try to fill this gap and attempt to assess scientifically the spill-over effects of SA's economic growth performance onto the rest of the CMA. The analysis does not attempt to isolate each of the channels through which SA economic growth could influence growth in the CMA, but focuses purely on quantifying the aggregate impact. Future research could assess the importance of alternative channels through which the growth spill-overs might be transmitted.

[1] *When South African sneezes, the neighbouring countries catch cold*.

The rest of the paper is organized as follows: Section 2 discusses trade trends between SA and the LNS countries. Section 3 reviews the literature on spill-over effects while section 4 describes the data and presents the analytical framework. Empirical results are covered in section 5 and section 6 concludes.

1.2 South Africa's Linkages with the LNS Countries

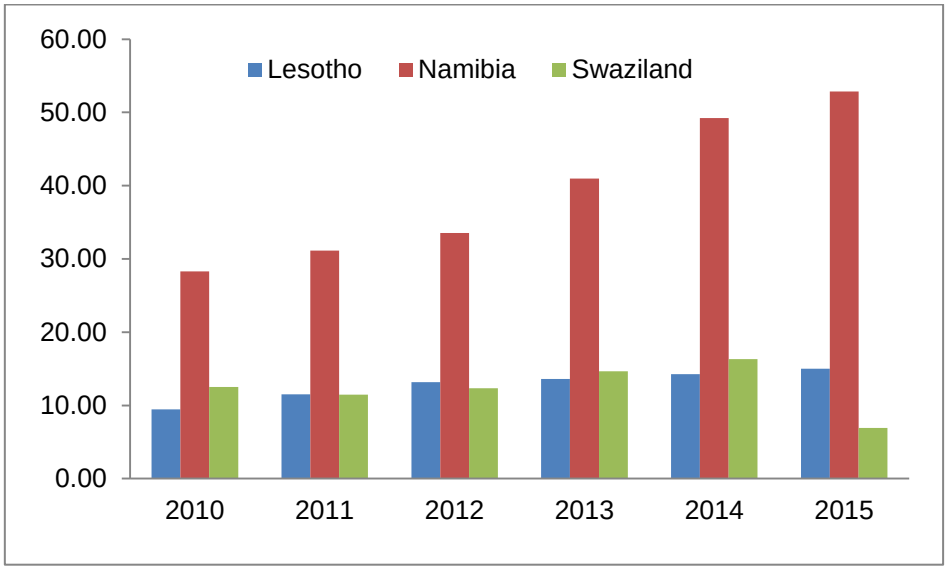
Relatively large economic size of SA and its growing linkages with other SSA economies implies that South African economic growth could have a significant influence on the rest of the CMA through various channels as already mentioned.

Trade Linkages

Literature has shown that there is positive relationship between openness and growth [for instance, Barro & Sala-i-Martin (1995); Sachs & Warner (1995) and Clemens & Williamson (2004)]. SA being the second largest economy in the SSA implies that it is an important export market for its immediate neighbouring countries such as Botswana, Lesotho, Namibia and Swaziland. In 2011, exports to SA accounted for more than 80 per cent of trade within the Southern African Customs Union (SACU) [Canales-Kriljenko, 2013]. Figure 2 depicts that in the CMA, around R50 billion worth of exports from SA were destined to Namibia in 2015, followed by Lesotho and Swaziland at lower levels of approximately R10 billion and R4 billion, in the same period, respectively. These exports from SA to LNS countries consist largely of prepared foods, mineral products, chemicals, machinery, and vehicles.

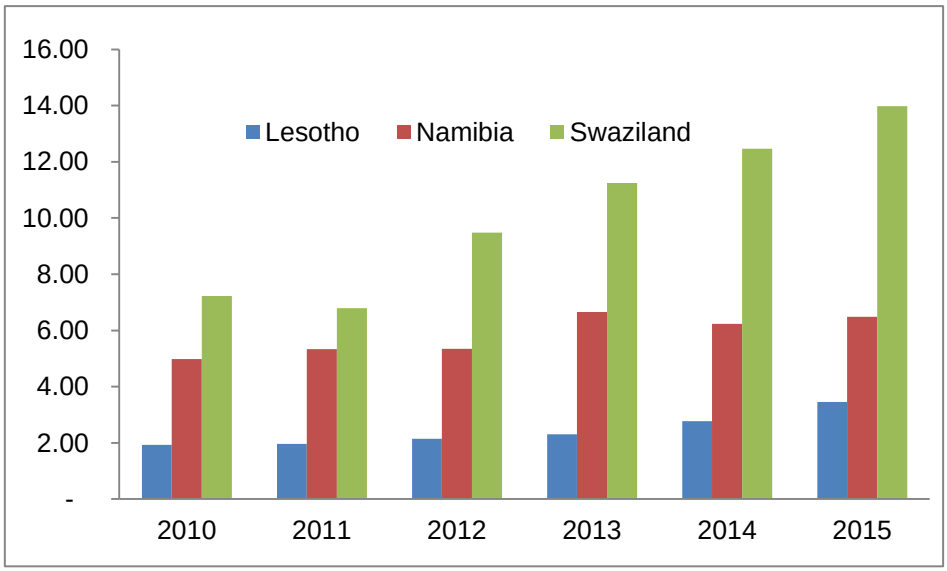
On the flipside, figure 3 shows that a significant value of imports from LNS countries to SA are largely from Swaziland at around R14 billion, followed by Namibia and Lesotho at approximately R6 billion and R3 billion, in 2015, respectively. Most of these exports to SA from LNS countries are in the form of live animals, prepared foods, textiles, footwear and machinery.

Figure 2: Value of South Africa's Exports to the CMA
(Billion Rands)



Source: South African Revenue Services (2016)

Figure 3: Value of South Africa's Imports from the CMA
(Billion Rands)



Source: South African Revenue Services (2016)

Even though the focus of the paper is purely on the CMA region, SA is also an important export market for countries in the 15-member Southern African Development Community (SADC) region.

Financial Linkages

SA is mostly often described as an engine of growth in SSA in the sense that it is the largest source of foreign direct investment and portfolio investment for the CMA (IMF various reports). Most of the retail chain stores, commercial banks, insurance companies, mobile network companies[2] etc operating across most countries in SSA are predominately SA companies.

Furthermore, SA remains an important source of remittances for many countries in the Southern African region. For instance, between 2011 and 2014, Lesotho's remittances from SA accounted for approximately 20 per cent of GDP, reflecting a huge number of migrant workers employed in the South African mines, even though these have steadily declined in line with the persistent decline in SA's gold production. Several studies have shown that remittances have a positive impact on economic growth if they are channelled appropriately (Srivastava & Chaudhary, 2007; and Zuniga, 2011).

Institutional Linkages

The regional monetary and exchange rate agreement such as the CMA agreement warrants interest rate and exchange rate pass-through from SA to the rest of the CMA countries. Hence through interest rate and exchange rate movements, policy actions in SA immediately affect economic and financial conditions in the rest of the CMA. According to the CMA agreement, the LNS respective national currencies are pegged at one-to-one with the Rand and as such, SA monetary policy is easily transmitted to the LNS countries (Ikhide & Uanguta, 2010; and Seleteng, 2014).

On the fiscal side, the revenue sharing mechanism in the SACU warrants strong links between SA imports and revenue in the BLNS[3] countries. As indicated earlier, in 2011, SA accounted for approximately 80 per cent of trade within SACU. In Lesotho, SACU is

[2] Such as: Shoprite, Pick n' Pay, Pep, Standard Bank, Nedbank, First National Bank etc.
[3] Botswana, Lesotho, Namibia and Swaziland.

an important source of government revenue accounting for about 42.3 per cent of total revenue in 2015 (CBL various publications, 2016).

1.3 Literature Review

Arora and Vamvakidis (2004) attempted to quantify the extent to which economic growth in the Unites States (US) is an 'engine' of the world economy. They estimated fixed effects panel regression using the data from 1980-98 and found significant positive impact of US growth (coefficient of US growth was close to one) in the rest of the world, especially developing countries.

Arora and Vamvakidis [2005(a)] used panel data estimation (Fixed Effects methodology) for 47 African countries for the period 1960 to 1999 in the context of standard growth model. The findings indicated that a 1 percentage point increase in South African economic growth is correlated with a 0.5 – 0.75 percentage point increase in growth in the rest of Africa.

On a similar token, Arora and Vamvakidis [2005(b)] investigated the extent to which a country's economic growth is influenced by the economies of its trading partners. Fixed Effects panel estimations for 101 industrial and developing countries over the period 1960-1999 were conducted. The findings revealed that a 1 percentage point increase in economic growth among a country's trading partner (ceteris paribus) is correlated with an increase in domestic growth of as much as 0.8 percentage points.

Another investigation into the spill-over effects by Arora and Vamvakidis (2010) used a unrestricted panel vector autoregression (PVAR) technique and error correction models (ECM) to estimate the role of China in the world economy. The analysis made use of panel data from 172 economies for the period 1960-2007. The findings revealed that a 1 standard deviation shock in Chinese growth reaches 0.4 percentage points over 3 years and 1 percentage point over 5 years. The results from ECM also confirmed these findings. Furthermore, the results depict that over the longer term, a 1 percentage point increase in China's growth is correlated with an average of 0.5 percentage point increase in growth of other countries.

Chen and Wu (2012) estimated a Solow-type growth model using a series of panel data methodologies[4] to examine the regional growth spill-overs in the 11 Pan Pearl River Delta (PPRD) provinces in China over the period 1985-2009. The estimation results confirm the existence of regional growth spill-over effects among these provinces. The findings showed that economic growth spill-overs of non-PPRD regions on the PPRD regions are greater than those among the PPRD members themselves. Furthermore, the findings depicted that world economic growth generates little spill-over effect on the economic growth of the PPRD regions.

Çakir and Kabundi (2014) estimated a structural dynamic factor augmented vector autoregression (FAVAR) model to investigate the impact of China on Brazil, Russia, India and South Africa (BRIS) countries over a period 1995Q2-2009Q4. The findings show that China's (demand and supply) shocks do have different impact on each of the BRIS countries. Furthermore, the results depict that across China and BRIS countries, transmission channels of the shocks are mainly through trade rather than financial implying that China is a dominant powerhouse when it comes to trade, but financial integration with BRIS is still in its infant stage.

1.4 EMPIRICAL ANALYSIS

(a) The Data

The analysis is based on annual data for four countries obtained from the World Bank Development Indicators (WDI) and IMF International Financial Statistics (IFS) for the period 1980 to 2014. This implies that $N = 4$ and $T = 34$, hence we have $N \times T = 136$ observations, therefore a use of panel time series is appropriate. The control variables are standard in the growth literature as discussed in Durlauf *et al.* (2005) and Levine and Renelt (1992) who used Leamer's extreme bounds analysis to analyse growth accounting regressions (see appendix for variable description).

(b) Methodology

The study makes use of panel time-series methodologies given the fact that they have several advantages. First, it allows us to specifically analyse the CMA case, amid all its

[4] i.e. Fixed Effects, Difference Generalised Methods of Moments and System Generalised Methods of Moments.

idiosyncrasies and differences inherent within, without necessarily treating it as an outlier or as a dummy, and therefore enables us to get a clear picture of the region. Second, the issue of statistical endogeneity (unobserved individual effects which are nested in the error term might be correlated with the regressors), and heterogeneity of intercepts are dealt with by Fixed Effects (FE) with robust standard error estimator, which provides consistent estimates in dynamic models when $T \to \infty$. The FE estimator allows the constant term to differ across cross-section units and it captures the time series dimension of SA growth effect after controlling for other growth determinants.

Economic endogeneity (reverse causality) was found to be present between economic growth and investment. The Generalised Method of Moments (GMM) method is often used to deal with this problem (Arellano & Bond, 1991; Arellano & Bover, 1995; and Blundell & Bond, 1998). Theoretical and empirical evidence has also identified that spill-over effects are usually analysed using impulse-response functions generated from estimating a panel vector autoregression (PVAR) model (Sims, 1980; Holtz-Eakin *et al*., 1988; Fry & Pagan, 2005; Love & Zicchino, 2006). Hence as robustness check, the paper goes further and explores results from this technique. The PVAR analyses the impact of shocks to the SA economic growth rate on economic growth rate in the other CMA countries. This technique allows for country-specific heterogeneity and also has advantages over other methods because it accounts for dynamics in the system and endogeneity probmlems. Therefore the impulse-response functions derived from this technique shows the response of economic growth rate in the CMA to an orthogonal shock from a variable of interest (SA economic growth rate). Due to the limited time-span of the data for the CMA countries, using a single VAR model will not be appropriate since this compromises the degree of freedom. A PVAR allows us to overcome this problem.

Before any estimation can be carried out, several panel unit root tests[5] were carried out so as to check for stationary of the variables and only two variables; gross fixed capital formation as a share of GDP *(inv*) and a measure of financial development (broad measure of money supply as a share of GDP – *M2*) were found to be integrated of order one, I(1), and therefore used in first differences in the regressions.

[5] Levin, Lin and Chu (LLC); Im, Pesaran and Shin (IPS); Augmented Dickey Fuller (ADF)-Fisher; and Phillips-Perron (PP) –Fisher panel unit root tests were conducted.

(c) Estimation

A simple correlation analysis was carried out before any econometric estimation and the results are depicted in table 1.

Table 1: Correlation Analysis

	CMA_g	*LNS_g*	*LSO_g*	*NAM_g*	*SA_g*	*SWZ_g*
CMA_g	1					
LNS_g	0.94***	1				
LSO_g	0.41***	0.46***	1			
NAM_g	0.44***	0.47***	0.09	1		
SA_g	0.60***	0.29**	0.07	0.16	1	
SWZ_g	0.53***	0.55***	-0.27	-0.18	0.19	1

The results from the correlation analysis depict that there is a positive significant relationship between our variables of interest: SA economic growth and economic growth in the CMA. This is in line with *a priori* expectations give the linkages in the region. When taking individual LNS countries into consideration, the relationship is still positive, but statistically insignificant.

The estimated heterogenous dynamic Solow growth model is as follows[6]:

$$g_{it} = \alpha_i + \beta\Gamma_{it} + \upsilon_{it}\ , \qquad \text{for country } i = 1, \dots, N \quad \text{year } t = 1, \dots, T \qquad (1)$$

whereby g denotes real GDP growth rate for the CMA,α_i is the matrix of constant terms for each country i; β is a matrix of parameters to be estimated; Γ_{it} is the matrix of independent variables that includes the variables that are standard in growth regressions; and υ_{it} is the stochastic error term. The growth determinates that are included in this growth model are; South African real economic growth rate (*SAg*), inflation rate (*INF*), broad measure of money supply (*M2*), gross fixed capital formation as a share of GDP (*INV*), openness to international trade (*OPEN*), and population growth rate (*POPG*).

1.5 Empirical Results

[6] See, Barro and Sala-ì-Martin (1995) and Levine and Renelt (1992)

As indicated in the empirical framework, the analysis makes use of Fixed Effects (FE), two variants of Generalised Methods of Moments (Difference-GMM and System-GMM), and Panel Vector autoregression (PVAR) method. FE and GMM are estimated in a step-wise fashion.

(a) FE and GMM Regression Results

The findings from estimating the FE models depict that SA's real economic growth does not have a positive impact on economic growth in the rest of the CMA region, even though the impact is statistically insignificant. The other control variables are also not statistically significant (with an exemption of CMA economic growth lagged once). The F* test indicates the evidence of country FE. The results derived after having addressed the issue of endogeneity among the variables by use of GMM estimators are similar to the FE results. As a robustness check, the AR(1) test and the Sargan test indicate that there is no serial correlation and that the restrictions are not over-identified, respectively.

Table 2: Estimation Results

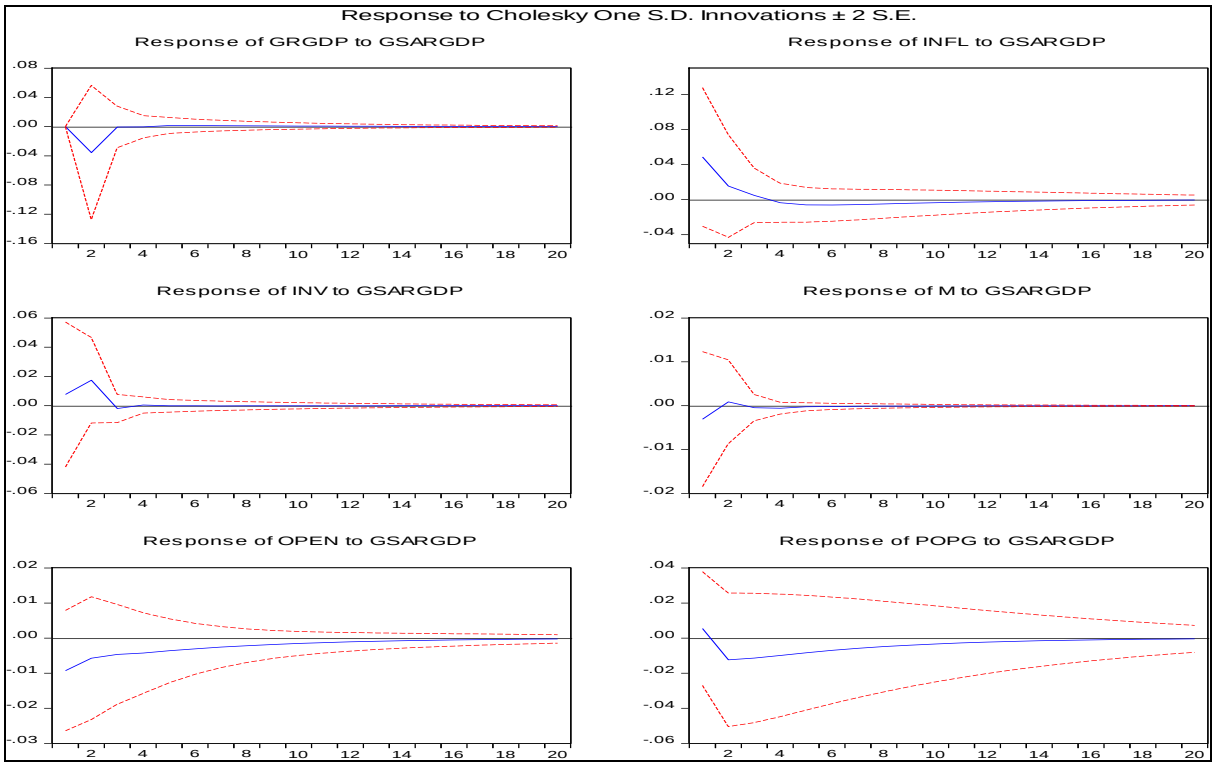
Dependent Variable: g						
	Fixed Effects		Difference GMM		System GMM	
	Model (1)	Model (2)	Model (1)	Model (2)	Model (1)	Model (2)
g(-1)	0.16**	0.15*	-0.09	-0.09	0.08	0.06
	(1.82)	(1.72)	(-0.97)	(-0.94)	(0.69)	(0.62)
SAg	0.04	0.07	0.00	-0.02	0.06	0.08
	(0.32)	(0.44)	(0.02)	(-0.23)	(0.54)	(0.77)
INF	0.12	0.03	-0.04	0.05	0.13	-0.01
	(072)	(0.15)	(-0.32)	(0.49)	(0.47)	(-0.05)
M2	1.92	1.82	1.71*	1.81**	2.07***	1.97***
	(1.05)	(0.98)	(1.65)	(1.75)	(3.28)	(3.45)
INV	-0.15	-0.12	0.14	0.10	-0.05	-0.03
	(-0.61)	(-0.48)	(0.84)	(0.58)	(-0.26)	(-0.16)
OPEN	-0.25	-0.09	-0.12	-0.51	0.16	0.20*
	(-0.44)	(-0.13)	(-0.21)	(-0.98)	(1.18)	(1.75)
POPG		0.18		-0.26**		0.24
		(0.71)		(-1.78)		(1.40)
-F* test	1.33	0.78				
[P-value]	[0.08]	[0.05]				
-Wald χ^2			3.11	8.49		
[P-value]			[0.00]	[0.04]		
-AR(1)					-1.78	-1.80
[P-value]					[0.08]	[0.07]
-Sargan Test χ^2					122.01	118.82
[P-value]					[0.01]	[0.01]

*/**/*** denotes significance at 10/5/1 per cent levels, respectively. T-ratios are in parenthesis.

b) PVAR Results

The graph on the top left corner of figure 4 shows that a one standard deviation shock to the SA economic growth results in an immediate decline in economic growth in the CMA economic growth for up to 2 periods (years) after the shock, even though the impact is statistically insignificant. The figure further shows that the impact of a shock to SA economic growth do not have significant impact on the other CMA variables such as inflation, investment, broad money, openness and population growth.

Figure 4: Impulse-Response Functions Derived From PVAR



In order to determine the ability of SA economic growth shocks to explain fluctuations in the economic growth in the rest of the CMA, a standard variance decomposition exercise is conducted and the results are presented in Table 3. Estimates represent the percentage of variation in the row variable explained by the column variable. The results depict that only 0.24 per cent of the variation in the CMA's economic growth can be attributed to shocks to SA's economic growth (both in the short-run and long-run)[7]. SA economic growth rate has more impact on inflation in the CMA region, accounting for about 1.49 per cent and 1.43 of its short and long run variance, respectively. This is then followed by the impact on trade, at about 1.2 per cent of both its short and long-run

[7] Shaded in the table

variance. The decomposition of SA growth rate indicates that it is most likely explained by its own variation at about 77.6 per cent and 76.1 per cent of its short-run and long-run variance, respectively.

Table 3: Variance Decompositions

Forecasting Horizon (Years)	*Fraction of Variance That Can Be Attributed to Shocks to:*						
	g	*SAg*	*Infl*	*Inv*	*M2*	*Open*	*Popg*
a) g							
10	99.01	0.24	0.08	0.41	0.04	0.13	0.06
20	98.98	0.24	0.08	0.42	0.05	0.14	0.08
b) SAg							
10	3.41	77.61	0.09	10.16	2.69	0.81	5.22
20	3.36	76.12	0.16	10.11	3.01	1.44	5.80
c) Infl							
10	0.68	1.49	78.55	1.06	6.09	1.10	11.01
20	0.69	1.43	74.72	1.37	6.81	2.59	12.38
d) Inv							
10	1.11	0.71	4.73	89.91	1.76	1.14	0.63
20	1.10	0.71	4.73	89.72	1.79	1.26	0.68
e) M2							
10	7.87	0.21	1.27	1.63	88.15	0.78	0.08
20	7.87	0.20	1.27	1.62	88.14	0.79	0.08
f) Open							
10	4.09	1.17	5.11	3.50	0.83	82.98	2.28
20	4.17	1.18	5.03	3.49	1.20	81.54	3.36
e) Popg							
10	1.79	0.44	1.67	5.84	20.73	17.49	52.01
20	1.59	0.40	1.89	6.10	20.40	20.25	49.35

To test for stability of the PVAR model, a number of diagnostic tests were conducted. The results show no evidence of serial correlation and heteroscedasticity. Furthermore, the model also passes the normality test.

In a nutshell, the results from all the estimated models (FE, GMM and PVAR) depict no evidence of spill-over effects of SA economic growth to economic growth in the rest of the CMA. The reasoning behind this lack of evidence may be attributed to the fact that most of the LNS countries trade mostly with other countries abroad, rather than SA only. For instance, Lesotho's textiles and clothing materials as well as diamonds are destined to the United States (US) and Europe, respectively. In addition, the growth drivers in LNS countries are not directly linked to SA. For instance, in Namibia, the growth drivers are mining, agriculture and tourism (SADC, 2014), whereas in SA the growth drivers also include manufacturing, construction and financial services.

1.6 CONCLUSION

The purpose of the study was to assess the spill-over effects of low SA economic growth on the CMA. Econometrically, the estimated results from the three models estimated indicate that economic growth in SA does not appear to have significant spill-over effects on the CMA. These findings are in line with Canales-Kriljenko *et. al.,* (2013). The reasons could be due to the fact that the CMA countries are trading significantly with other countries abroad, apart from SA. Second, the growth drivers in the LNS countries are not directly linked to SA's economic growth. Third, there is insufficient time-series data in the CMA countries to adequately estimate spill-over effects.

However, a simple correlation analysis shows that there is indeed a positive relationship between economic growth in SA and the entire CMA. Hence, implying that a slowdown in SA's economic growth is likely to have negative implications on the economic growth in the CMA. For future research, there is a need to conduct a detailed analysis of different channels through which the growth spill-overs might be transmitted, since this study just looks at the spill-over effects in a generalised fashion.

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APPENDIX

Annual data: 1980 - 2014		
Variable	Acronym	Description
Real GDP growth in CMA	*g*	Real GDP growth rate (annual % changes)
SA Real GDP growth	*SAg*	South Africa's Real GDP growth rate (annual % changes)
Inflation	*infl*	Consumer price inflation (annual % changes)
Investment	*inv*	Gross fixed capital formation (% of GDP)
Broad Money	*m2*	M2 (as % of GDP)
Trade	*open*	(Imports + Exports) of goods and services (% of GDP)
Population growth	*popg*	Annual population growth rate