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A causal analysis between exports, imports and GDP per capita in the Southern African Customs Union Countries

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ABSTRACT

This study investigates the direction of causality between exports, imports and GDP per capita in the SACU countries: Botswana, Lesotho, Namibia, South Africa and Eswatini (Swaziland). The Toda-Yamamoto augmented Granger no-causality approach is applied. The study finds mixed causality results between exports, imports, and GDP per capita for the different countries. The export-led growth hypothesis is supported for Botswana and Eswatini, while import-led growth hypothesis is only confirmed in Namibia. Results suggest that a bi-directional Granger causality between exports and growth for Botswana and bi-directional Granger causality between imports and growth for Lesotho and South Africa exist. There is therefore no clear time-precedence. Finally, there is evidence of growth-led export hypothesis for Botswana, Lesotho, and South Africa. These mixed findings indicate that SACU countries should not solely dedicate their available resources to pursuing trade openness in promoting economic development but also address domestic economic reform strategies.

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1. Introduction

The relationship between trade openness and economic growth remains a highly studied topic in the international economics literature. Countries pursue such policies with the expectation of reaping benefits from opening their economies. Generally, it is argued that trade openness has a significant impact on the maximization of economic output and welfare. Kim and Lin (2009) attests that these benefits include easing the dissemination and absorption of the latest technology and knowledge from high-tech imports. Secondly, trade openness enables easy access to innovation sources and direct foreign direct investment. Furthermore, increased markets allow countries to take advantage of increasing returns to scale and specialization. Andersen and Babula (2009) also adds that increased trade openness expands the size of the market for new products. According to the OECD (1998), countries that are more open and outward-orientated have persistently shown to

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outperform those with limited trade scale. In addition, the IMF (1997) states that trade policies fit amongst the most crucial factors for promoting economic growth in developing countries. Rodriguez and Rodrik (1999) have, however cautioned that policy makers should not regard trade openness as a substitute for a more internally focused domestic strategy. Thus, complementary domestic institutions should also be prioritized over detrimental obsession with trade openness (Hallaert, 2010).

Despite the consensus on the positive effect of openness on economic growth, the specific channel in which trade affects the rate of growth is still controversial. Whilst there have been several studies on the trade-growth nexus on most of the individual South African Customs Union (SACU) countries, there is still no integrated framework empirical study on the Customs Union as a whole. Furthermore, most of the studies conducted on these individual SACU countries are focused on the export-led growth (ELG) hypothesis (Jordaan and Eita, 2007; Sunde and Ogbokor, 2018) and not much attention has been given to the import-led growth (ILG) hypothesis (Gossel and Biekpe, 2013). Although import-led growth may be perceived as merely domestic economic growth, domestic producers can take advantage of technological innovation from advanced economies by increasing demand for latest capital goods from abroad. This increased importation of the latest technology should improve productivity and reduce production costs and as a result increase output or "import-led growth". Export-led growth interest in literature can be attributed to the common belief that exports are one of the main determinants of any country's economic growth. Increase in exports creates an inflow of foreign currency that can be used to finance the much-needed imports of capital and intermediate goods which might have the latest technologies and knowledge leading to productivity improvements (Mehta, 2015; Kalaitzi and Chamberlain, 2020).

The Southern African Customs Union (SACU) was founded in 1910, making it the world's oldest customs union. Despite the extensive exploration of trade-growth nexus (mostly between exports and growth) in recent literature, there is still no consensus among economists on the direction of causality (Gossel and Biekpe, 2013). This can be attributed to the use of different econometric techniques, period of study, inclusion of related variables in the estimated equation or whether these used variables are in nominal or real terms (Ee, 2016). This study will therefore try to fill the existing gap within the literature to have an integrated trade-growth causality analysis across SACU to reinforce trade policy making. The purpose of this study is therefore to examine the direction of causality between imports, exports and economic growth for the five SACU countries. However, the authors take cognizance that correlation does not always imply causation and as a result, this study will provide reduced-form (non-structural) causation evidence for time-precedence between imports, exports and economic growth deemed necessary for consideration by SACU countries during policy making discussions.

The rest of the paper is organized as follows: Following Section 1 which gives the introduction of the study, Section 2 provides a broad theoretical and empirical literature review on trade openness and economic growth as well as summarised country-specific literature review. Section 3 discusses the methodology of the paper, and thereafter Section 4 provides a discussion of the econometric analysis and empirical findings. Lastly, Section 5 concludes the study.

2. Literature review

As with most countries globally, developing countries have received a considerable amount of attention concerning the analysis of trade-growth nexus. This perpetual curiosity in developing countries is driven by the view that international trade plays a significant role

in allowing developing countries to have access to the ideas or research and development that exists in the rest of the world (Snowdon and Vane, 2005). Grossman and Helpman (1990) argued that developing countries potentially stand to gain the most from trade openness as they can absorb a large stock of advanced technologies from more developed countries.

With a considerable volume of research effort into the relationship between trade and economic growth in developing countries, empirical findings are still mixed. However, Greenaway et al. (2002) ascribes such inconsistent conclusions to the use of different sample sizes and methodological approaches, different (trade liberalization) measures and misspecified models. Some researchers have kept the view that the effects of trade on growth depends on the level of a country's economic development. Studies have shown that the impact of trade on growth is not automatically consistent between advanced and less developed countries (Harrison, 1996; Yanikkaya, 2003; Dowrick and Golley, 2004; Rassekh, 2007; Kim and Lin, 2009). Kim and Lin (2009) found that there is an income threshold above which increased trade openness has beneficial effects on economic growth, and below which has detrimental effects on the economy. Thus, by implication, these low-income countries will only benefit from trade as their economies develop to reach and surpass the specified income threshold.

Bhagwati (1958) observed the causality between growth and trade as he noted that economic expansion may have both positive and negative effects on the welfare of the country. He therefore finds that (i) the production of importable goods may increase due to economic expansion, at constant terms of trade, (ii) the increase in the price may decrease the consumption of importable goods, and (iii) economic growth can cause, through price change, the production of importable goods to increase. This implies that if the home country demands less imports because of its economic expansion, the rest of the world will be afflicted as it will be supplying less to this country. There is also growing empirical evidence in support of bi-directional relationship between exports, imports, and economic growth (Jordaan and Eita, 2009; Gries and Redlin, 2012; Gossel and Biekpe, 2013). Paudel (2014) uses cross-section data from 193 developing countries to study the effect of trade liberalization on economic growth. He divides the developing countries into the World Bank classifications and the results then indicate that developing countries benefit from trade openness according to their initial level of development. Lower-middle income countries benefit at least 3% more than all the other developing countries on average, if they become open.

Mehta (2015) found no evidence of causal relationship between imports and gross domestic product (GDP) for India, however only a uni-directional causality from GDP to exports was supported by results. Nevertheless, the Toda-Yamamoto causality test results by Kumar (2018) supported export-led growth and import-led growth hypotheses for India. Yuksel and Zengin (2016) have reported mixed findings on the causality between import, export and growth for five developing countries: Argentina, Brazil, China, Mexico and Turkey. Using Toda Yamamoto causality test, they found the export-led growth to be valid for only Argentina.

Bakari (2017a) used the time series techniques to study the relationship between investment, imports, exports and economic growth in Egypt and found that exports negatively affect economic growth in the long run whilst imports positively affect GDP in both the short and long runs. Applying similar techniques on data obtained from Tunisia, results confirm that exports negatively affects economic growth in the long run, although economic growth positively affects exports (Bakari, 2017b). For Panama, the Granger-Causality tests indicated a uni-directional causality from imports and exports to economic growth (Bakari and Mabrouki, 2017).

As a further investigation of the impact of trade openness on economic growth in developing countries, Zahonogo (2016) finds a positive and significant impact of trade openness on economic growth in sub-Sahara Africa, subject to specific trade openness thresholds. The ratio of imports to GDP of 33.16% shows that increasing imports can cause economic growth to decline. It is therefore implied that the composition of the developing countries' imports be scrutinized and controlled.

Syzdykova *et al*. (2019) investigated the effect of imports and exports on the national income of Kazakhstan using the quarterly data for the period 2000-2017. Their results suggested a long-run causal relation from imports and exports to economic growth and also a positive effect of GDP on imports, thus there is a bi-directional causality between economic growth and imports. Results from a study conducted by Miyan and Biplob (2019) on the nexus between exports, imports and economic growth in Bangladesh indicate that exports causes economic growth in the short run. Further evidence of the export-led hypothesis was provided by Mensah and Okyere (2020) in an export-growth nexus analysis for Ghana, using monthly data for the period 2010-2019. Applying Granger causality technique, results suggested that export-led growth holds for Ghana.

Etahisoa (2020) found no long-run relationship between imports, exports and economic growth in Madagascar. Using the annual data for the period 1957-2017, imports and exports leads to economic growth only in the short run. Kalaitzi and Chamberlain (2020) applied multivariate Granger causality technique to investigate the causality between exports and economic growth in the Gulf Cooperation Council Countries. The results were mixed. They found export-led growth to be valid for the United Arab Emirates, an export-growth bi-directional causality for Kuwait and no causality between exports and economic growth for Oman and Saudi Arabia in the short run. Adebayo (2020) employed the Toda Yamamoto causality test and wavelet coherence technique to explore export-growth nexus in Nigeria and reported a bi-directional causality between export and economic growth.

Using Panel data techniques, Sunde and Ogbokor (2018) confirms the export-led growth hypothesis by finding that exports are positive and significant in explaining GDP per capita in SACU countries. Raghutla and Chittedi (2020) examined the short- and long-run causality between trade openness and economic growth in BRICS countries. In the short run export-led growth is accepted for Brazil and China, and import-led growth is confirmed for China. Results further indicate that exports cause economic growth in the long run in Brazil and Russia, and the growth-led hypothesis is confirmed for Brazil, China, India and South Africa.

It is therefore evident that these studies provide a wide spectrum of results with no clear consistent answer. The various SACU countries will now briefly be discussed to provide background.

2.1 Overview of SACU countries

Botswana

Botswana is a landlocked country in Southern Africa and joined SACU in 1910, while experiencing significant growth since gaining independence in 1966. The country discovered diamonds shortly after independence, opening it to foreign investors, which resulted in the establishment of strong international ties (Beaulier, 2003). Botswana is considered to be one of the fastest growing economies in Sub-Saharan Africa and its rapid growth is attributed to diamond-dominant exports (Malefane, 2020). Botswana changed to a new industrial policy that encouraged highly productive and efficient exporting industries in 1998 (Sekwati, 2011).

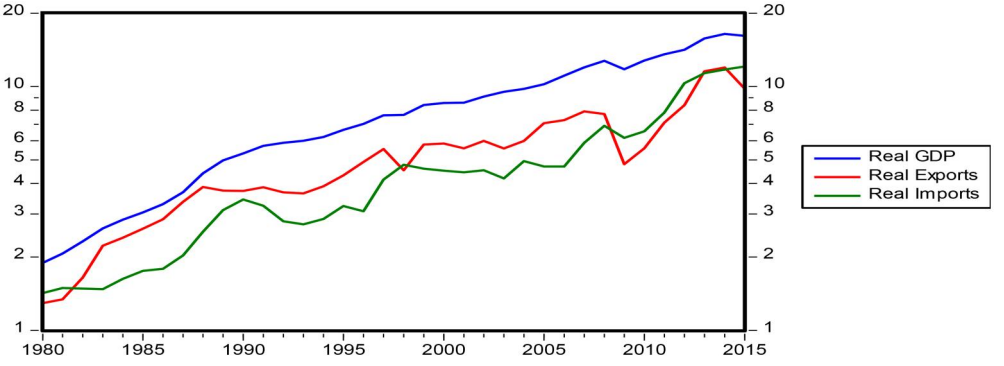

Figure 1. Real Exports, Imports and GDP in Botswana.
Source: Data obtained from World Development Indicators

Figure 1 provides an informal investigation of the relationship between the exports and imports of goods and services and GDP for Botswana. The vertical axis indicates the log of exports, imports, and GDP for the period 1980-2015 and the figure suggests the possibility of a long-run relationship between these variables. The figure shows that GDP, exports, and imports have been following an upward trend over the period 1980 to 2015 and that exports have always been greater than imports except between 2008 and 2013.

Although Botswana's exports composition has evolved over time, it is still heavily reliant on primary sector exports (Malefane, 2018). In recent years, the share of mining in Botswana's economy increased from 15.3% of GDP in 2009 to 22.9% of GDP in 2014 (Baker, 2016). Notwithstanding few empirical studies which have not found any significant relationship between international trade and economic growth within the SACU region (Manwa *et al*., 2019), exports have been empirically found to be significant to Botswana's economic growth (Jordaan and Eita, 2009; Ee, 2016; Malefane, 2018; Sunde and Ogbokor, 2018). Furthermore, Jordaan and Eita (2009) reports that there is also a reciprocal effect from economic growth to exports whereas Malefane (2018) finds no empirical evidence to support the import-led hypothesis. Malefane (2020) applying the ARDL bounds approach revealed that the overall trade openness and exports have a positive and significant effect on Botswana's economic growth.

Lesotho

Lesotho is a relatively small and landlocked country in Southern Africa, categorized as a Least Developed Country (LDC) (UN, 2016). Lesotho's Ministry of Trade, Industry and Corporate Marketing established the Trade Promotion Unit in 1978 with the goal to promote, coordinate and develop the country's foreign trade (WTO, 2009). Lesotho constitutes the smallest economic size amongst the five SACU countries with the recorded nominal GDP at market prices to be R33.7 billion in 2016 (SACU, 2021). The country gained independence in 1966, adopting an industrial development strategy in 1967, in which export-led growth became the key strategy emphasizing the fostering of manufacturing and processing industries.

Figure 2 shows Lesotho's real exports, imports, and GDP between 1980 and 2020 with imports consistently greater than exports. Lesotho's imports have accounted for over 90% of the country's GDP in recent years, whereas exports have constituted about 40% of the GDP (Government of Lesotho, 2018). Despite Lesotho's recognizable efforts to open the economy since the country's independence, economic growth has not significantly

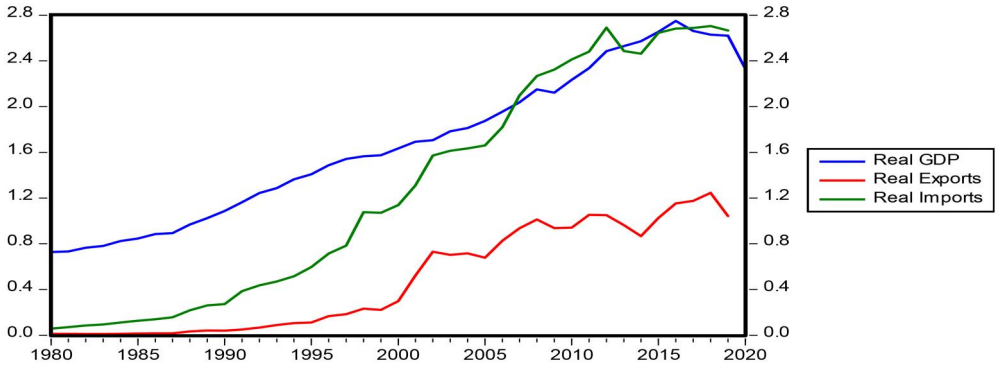

Figure 2. Real Exports, Imports and GDP in Lesotho.
Source: Data obtained from World Development Indicators

responded to changes in trade openness (Malefane and Odhiambo, 2019). Thus, Malefane and Odhiambo (2019) found the empirical evidence to indicate that there is no significant short or long-run relationship between trade openness and economic growth in Lesotho. According to Young (1991), the LDC countries will experience dynamic losses in technical progress and economic growth when their international trade increases. By implication, Lesotho's economic growth cannot improve by increased trade openness alone. Lesotho's adamant reliance on trade policy for the country's economic development remains controversial against empirical evidence. The lack of significant positive correlation between trade openness and economic growth may be due to the country's trade volume being above the required threshold enabling the country to reap benefits from international trade. As argued by Zahonogo (2016), trade openness will only have beneficial growth effects on sub-Saharan African countries up to a certain threshold, beyond which the trade effect on growth declines.

Namibia

Namibia, a member of SACU, is a highly open economy with a small, mostly rural population gaining independence in February 1990. About 40% of Namibia's fiscal revenue originates from SACU common revenue pool (Ogbokor and Meyer, 2016). The country adopted the Export Processing Zone in 1995 aimed at attracting investment towards export production and encouraging skills and technology transfer (Bank of Namibia, 2002). Figure 3 gives a snapshot of Namibia's exports, imports, and GDP trend from 1980 to 2020, showing a positive trend throughout the period.

In their empirical Granger causality analysis, Jordaan and Eita (2007) found that exports Granger causes economic growth and GDP per capita in Namibia, however imports do not. It was further reported that there is no causality from GDP to exports, that is, growth-led export hypothesis does not hold for Namibia. Ogbokor and Meyer (2016) assessed the long-run relation between foreign trade and economic growth in Namibia and found that exports Granger-causes the country's economic growth. On a sectoral level, Simasiku and Sheefeni (2017) used the quarterly time series data for the period 1990-2014 to investigate agricultural exports and their findings supports an export-led growth hypothesis. Mosikari and Eita (2020) studied the asymmetric nexus between Namibia's three main export sectors (diamonds, live animal products and manufactured food) and growth and their results suggested that a positive symmetric relationship.

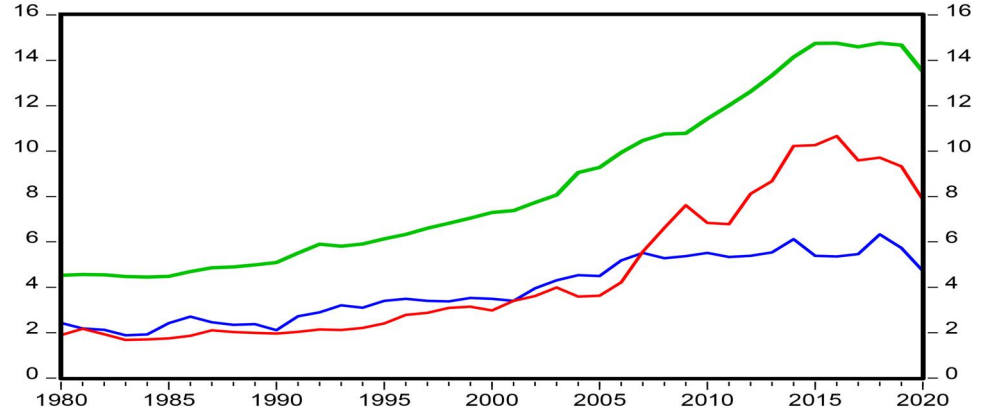

Figure 3. Real Exports, Imports and GDP in Namibia.
Source: Data obtained from World Development Indicators

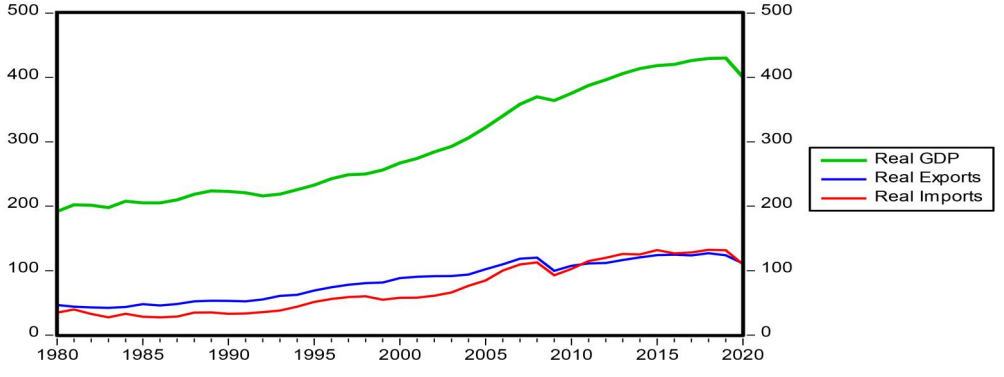

Figure 4. Real Exports, Imports and GDP in South Africa.
Source: Data obtained from World Development Indicators

South Africa

South Africa has the largest economy amongst the SACU countries and became a member of SACU in 1910 (Manwa, et al., 2019). The adoption of the import substitution commenced around 1925 when the country implemented the Customs Tariff and Excise Duty Amendment Act (Malefane and Odhiambo, 2017). In the 1990s, the General Export Incentive Scheme was introduced to provide tax free financial export subsidy to the exports' producers conditional on their export value, processing degree and amount of local content of the export goods. The country's three largest export categories include precious metals (gold and platinum), base metals and mineral products, respectively.

Conforming to the general conclusion on trade-growth causality analysis, findings on the causality between exports, imports and economic growth in South Africa are also mixed. For example, using the time series data for the period 1964-1993, Ukpolo (1998) reports that there is no evidence for export-led hypothesis for South Africa. However, there is evidence that economic growth Granger-causes exports. In a later study by Gossel and Biekpe (2013), it is found that both exports and imports are amongst the primary drivers of the South African economy. The export-led hypothesis for South Africa is further supported by results reported by Malefane (2018) indicating that trade positively impacts economic growth.

Using the quarterly time series data ranging from 1975 to 2012, Feddersen, et al. (2017) found that exports positively impacts GDP in the short-run outright, however in the long run, the positive impact of exports on economic growth depends on their ability to encourage faster capital formation. Ratombo (2019) has found empirical evidence in support of import-led growth but has found exports to have a negative impact on GDP. Habanabakize (2020) reported that in South Africa economic growth positively leads to increase in imports and exports. Furthermore, it is found that there is a bi-directional causality between imports and economic growth in South Africa.

Eswatini

Eswatini is a small landlocked country in Southern Africa, sharing borders with Mozambique and South Africa. The World Bank classifies Eswatini as a lower-middle-income country (World Bank, 2020), highly dependent on international trade with a recorded average share of trade in goods and services to GDP of 127.6% between 2008 and 2012 (WTO, 2015). Eswatini's acceptance of the export-led growth hypothesis can be explained by its commitment to diversifying and expanding its export sector over the years (Sinoha-Lopete, 2006). The results by Mpatane and Eita (2016) reveal that a positive relationship exists between manufactured exports and economic growth. However, the country has recorded an average decline in GDP growth rate from 2.9% over the period 2003 to 2008, to 2.1% during the period 2008 to 2014. Simultaneously, there has been a decline in the country's export over the latter period from 59.1% in 2008 to 56.7% in 2012, as a percentage share of GDP (WTO, 2015). The country's exports were dominated by manufactures accounting for 62.5% of the total merchandise exports in 2013 and merchandise imports dominated by manufactures, accounting for 59% of the total imports. Figure 5 shows Eswatini's trend in real exports, imports, and GDP between 1980 and 2020.

An empirical study by Sinoha-Lopete (2006) finds that the export-led growth hypothesis is evident in Eswatini. Using Likelihood Ratio test, the study finds no support for either growth-led export or import-led growth hypothesis.

These findings correlate with conclusions by Sunde and Ogbokor (2018) that exports significantly explains economic growth in the SACU region. The reviewed SACU literature employed different levels of economic development, different methodologies, sample size and variable proxies. All SACU countries have shown support of the trade-led growth hypothesis and as a result adopted trade policies aimed at increasing trade liberalization and integration into the world markets. Sinoha-Lopete (2006) explains that the causality

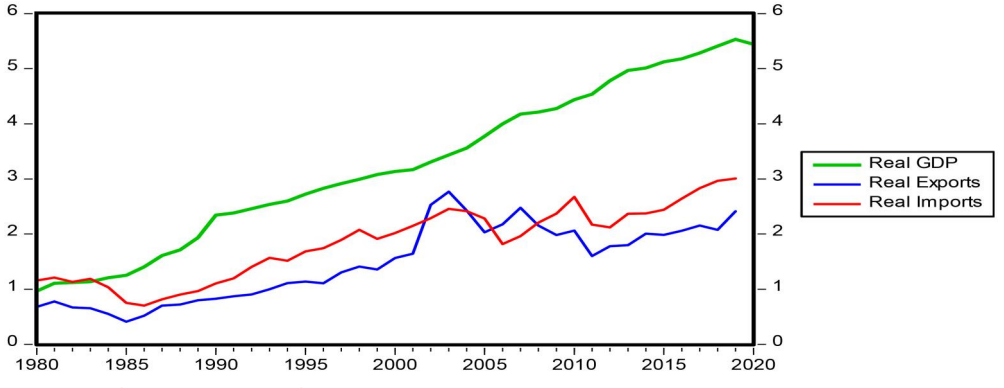

Figure 5. Real Exports, Imports and GDP in Eswatini.
Source: Data obtained from World Development Indicators

direction between trade and growth for Southern African countries varies from region to region depending on each country's economical and/or political characteristics.

3. Estimation techniques and empirical analysis

3.1 Model specification

The paper adopts the augmented production function which incorporates both exports and imports, as attested by Awokuse (2006) and studies their effect on economic growth in the SACU member states:

$$lnGDPpc = f(lnEXP, lnIMP, lnCAP, lnHCI) \quad (1)$$

With the descriptive summary of all variables provided below:

GDPpc Real GDP per capita as a proxy for economic growth (dependent variable)
EXP Exports of goods and services as a percentage of GDP
IMP Imports of goods and services as a percentage of GDP
CAP Investment spending as measured by real Gross Fixed Capital Formation
HCI Human Capital Index based on years of schooling and returns to education

The real GDP per capita is the dependent variable and is a more reliable economic measure because it adjusts for differences in population size. All variables are expressed in natural logs, with the effect of transforming multiplicative models into additive models. (Brooks, 2008).

3.2 Estimation techniques

This study adopts the modified version of the Granger (1969) non-causality test technique, first used by Toda and Yamamoto (1995). The Toda-Yamamoto test was used to overcome the shortcomings of the traditional Granger causality test, namely that it is not suitable for variables integrated of order one. Thus, the test does not consider the possibility of non-stationarity or cointegration among the variables (Wolde-Rufael, 2005). As a secondary shortfall, the traditional Granger causality test requires all variables to be in first difference before estimation which presents the risk of wrongly showing the order of integration for the time series. Conversely, the modified Wald test minimizes this risk by estimating the standard VAR model while variables are in levels rather than first difference.

The Toda and Yamamoto approach uses an augmented SVAR $k + dmax$ which generates an asymptotic VAR statistic in the form of Chi-Squared distribution, where k is the optimal lag length and $dmax$ is the maximum order of integration (Toda and Yamamoto, 1995). The estimation procedure will proceed with unit root (stationarity) tests, optimal lag length test, cointegration test and Granger causality test.

3.2.1 Unit Root Test

A time series is non-stationary if the mean, variance, and covariance of the time series are not constant over a period (Fannoun and Hassouneh, 2019). This study uses the widely applied Augmented Dickey-Fuller (ADF) (1979) unit root test and the Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) (1992) to test for stationarity and determine the maximum order of integration for the variables. It is important to note that the null hypotheses for both tests are the opposite of each other. The ADF is based on the null hypothesis that the time series has a unit root (non-stationary), while the null hypothesis for the KPSS is that

the time series is stationary. Therefore, a cross-check of the results from both tests is important. The variable with the highest order of integration gives the maximum order of integration for the study. For example, if $X_t = I(0)$ and $Y_t = I(1)$ then the maximum order of integration is 1. Similarly, if $X_t = I(2)$ and $Y_t = I(1)$, the maximum order of integration becomes 2.

3.2.2 Toda-Yamamoto approach

This causality approach will be conducted according to the following basic steps:

i. Determination of the maximum order of integration as described above.
ii. Specify the VAR model in levels regardless of the order of integration.
iii. Determining the optimal lag length (k) using sequential modified LR test statistic (LR); Final prediction error (FPE); Schwarz information criterion (SC) and Hannan-Quinn information criterion (HQ).
iv. A cointegration test will be carried out using the Johansen methodology to determine the long-run relationship between two or more time series with the same order of integration.
v. Regardless of the cointegration test outcome, the VAR($k + d_{max}$) model using suitable lags for every equation in the system is defined.
vi. Granger causality analysis can be described as follows: Assuming two time series, X and Y, X is said to Granger-cause Y if the future values of Y can be better predicted using the past values of both X and Y than it can by using the past values of Y alone. As an illustration the VAR model for both variables can be described as:

$$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \ldots + \alpha_p Y_{t-p} + \theta_1 X_{t-1} + \ldots + \theta_p X_{t-p} + \varepsilon_t \tag{2}$$

$$X_t = \beta_0 + \beta_1 X_{t-1} + \ldots + \beta_p X_{t-p} + \gamma_1 Y_{t-1} + \ldots + \gamma_p Y_{t-p} + v_t \tag{3}$$

Were,

$$H_0 : \theta_1 = \theta_2 = \ldots = \theta_p = 0 \quad H_A : Otherwise$$

If H_0 is rejected, then it is said that X does not Granger-cause Y, and similarly

$$H_0 : \gamma_1 = \gamma_2 = \ldots = \gamma_p = 0 \quad H_A : Otherwise$$

If H_0 is rejected, then it is said that Y does not Granger-cause X.

vii. Finally, revisiting the conclusion about the cointegration test on the VAR model. If two or more time series are cointegrated, then there must be a uni-directional or bi-directional causality between them, however, the opposite is not true. (Dritsaki, 2017).

The general Toda-Yamamoto VAR model followed can be specified as:

$$Y_t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} Y_{t-i} + \sum_{j=k+1}^{k+d_{max}} \alpha_{2j} Y_{t-j} + \sum_{i=1}^{k} \beta_{1i} X_{t-i} + \sum_{j=k+1}^{k+d_{max}} \beta_{2j} X_{t-j} + \varepsilon_{1t} \tag{4}$$

Where k is the optimal lag length as determined by the different lag selection criterion and d_{max} is the maximum order of integration.

3.3.3 VAR Stability test

It is advisable to perform the post estimation diagnostics to ensure that the model used for inferences is stable, errors are normally distributed, and no existence of heteroscedasticity or autocorrelation exist.

3.3 Data description

The data set originated from two sources. Data on real exports, real imports, gross fixed capital formation and real GDP per capita consists of yearly observations obtained from World Development Indicators, whereas the human capital index came from the Penn World Table 9.0. The data covers the period 1970 to 2014 for Botswana, Lesotho, South Africa and Eswatini and the period 1980 to 2014 for Namibia due to data limitations. All variables are in natural logs to generate linearity in parameters and easy interpretation. With the exception of South Africa, data on some variables were not available for certain periods in the time series. Backward extrapolation and/or interpolation techniques were applied to fill in gaps where data were not available. This paper adopts the following linear extrapolation equation as used by Smith and Sincich (1988):

$$P_t = P_l + \frac{x}{y}(P_l - P_b) \tag{5}$$

Where,

P_t = variable extrapolation for the target year

P_l = variable in the year of the earliest observed variable size used to make the projection (launch year)

P_b = variable in the year of the latest observed variable size (base year)

x = number of years in the extrapolation horizon

y = number of years in the base period

4. Discussion of empirical findings

4.1 Stationarity tests

This section provides the discussion of the results based on the methodology applied with all tests performed using EViews 10 statistical software. The ADF test, tests the null hypothesis of a unit root, while the null hypothesis for the KPSS is that the time series is stationary. Thus, with the ADF test, the null hypothesis of non-stationarity is rejected if the t-statistic is less than the critical values at 1%, 5% or 10% significance level. Alternatively, the KPSS test rejects the null hypothesis of stationarity if the LM-statistic value is greater than the critical values at 1%, 5% or 10% significance level. Therefore, rejecting the null hypothesis for the ADF test should be justified by accepting the null hypothesis for the KPSS test.

The unit root test results in levels and first difference per variable for each of the five SACU member states are available from the authors. Only results on trend and intercept are reported. As reported in the table, the unit root results suggests that most variables are integrated of order 1, thus I(1), although the human capital index is integrated of order 2 [I(2)]. Capital for Botswana is the only variable which is strongly supported by both ADF and KPSS test to be stationary at levels. Overall, the maximum order of integration for variables is 2. Thus, there is a possibility of long-term (cointegrating) relationships between variables cointegrated to the same order and as a result the Johansen (1991) procedure is applied to test for cointegration.

4.2 Optimal lag length and Cointegration test

An optimal lag length of 2 is selected for all five countries based on the following criterion: sequential modified LR test statistic (LR); Final prediction error (FPE); Schwarz information criterion (SC) and Hannan-Quinn information criterion (HQ). The results of the optimal lag selection as well as the Johansen cointegration tests for all countries are available on request from the authors. The EViews output shows the presence of cointegration among variables for Botswana, Lesotho, Namibia, and South Africa, and no cointegration for Eswatini.

4.3 VAR Stability test

The graphs indicates that the VAR stability condition is satisfied, and no root lies outside the unit circle (graphs available upon request).

4.4 Toda-Yamamoto causality test results

The results of the Toda-Yamamoto causality test are provided in Table 1. The level VAR model is first re-specified to a modified VAR ($k + d_{max}$) and the Granger non-causality test is carried out from the modified Wald test which follows the Chi-square distribution.

Results for Botswana show a bi-directional Granger causality between GDP per capita and exports. Overall, results suggest an export-led growth hypothesis for only Botswana and Eswatini, although exports indicate weak significance at 10% to GDP per capita in Botswana.

For Botswana, these results imply that the persistent increase in exports have boosted economic growth through improved productivity, economies of scale, and specialisation. In turn, economic growth led to further increase in exports through technical progress, comparative advantage, and more economies of scale, as argued by Tsen (2006).

There is no export-led growth evidence for Lesotho, Namibia, and South Africa. However, results show evidence of growth-led exports hypothesis for Botswana, Lesotho, and South Africa and no evidence of Granger causality between exports and economic growth for Namibia.

With regards to imports, results indicate that imports are significant to GDP per capita in Namibia and a bi-directional relationship between imports and GDP per capita for Lesotho and South Africa.

The results on the relationship between imports and economic growth in South Africa are in line with the findings by Gossel and Biekpe (2013). Results further suggests that there is no Granger causality between imports and GDP per capita in Botswana, in line with findings by Malefane (2018 and 2020).

Results further show the evidence of a bi-directional relationship between gross fixed capital formation and economic growth for Botswana and Eswatini. However, for Lesotho and South Africa, results show a uni-directional causality from economic growth to capital. There is no evidence of causality between capital and GDP for Namibia. A weakly significant relationship between economic growth and human capital index is reported for South Africa, although a strong positive and significant effect of human capital index is observed for Namibia. Results suggest no causality between HCI for Botswana, Lesotho, and Eswatini.

The results as provided in Table 1 suggest mixed conclusions for the different SACU countries. A positive, although weakly significant bi-directional Granger causal relationship between exports and economic growth is observed for Botswana; a uni-directional causal

Table 1. Toda and Yamamoto causality test results.

BOTSWANA					
		Dependent variables			
Independent variables	GDP	Exports	Imports	Capital	Human Capital Index
GDP	–	4.7384*	0.6969	5.3569*	0.0387
		(0.0936)	(0.7058)	(0.0687)	(0.9808)
Exports	5.7071*	–	0.2717	4.3291	0.0309
	(0.0576)		(0.8730)	(0.1148)	(0.9846)
Imports	0.4486	5.4176*	–	4.5690	3.7762
	(0.7991)	(0.0666)		(0.1018)	(0.1514)
Capital	11.9819***	2.8226	0.3538	–	3.1013
	(0.0025)	(0.2438)	(0.8379)		(0.2121)
Human Capital Index	0.8959	7.3915**	2.0134	3.6403	–
	(0.6389)	(0.0248)	(0.3654)	(0.1620)	
LESOTHO					
Independent variables	GDP	Dependent variables			
		Exports	Imports	Capital	Human Capital Index
GDP	–	35.1265***	43.540***	32.6679***	0.3903
		(0.0000)	(0.0000)	(0.000)	(0.8227)
Exports	0.0866	–	11.6198***	10.1246***	1.6663
	(0.9576)		(0.0030)	(0.0063)	(0.4347)
Imports	6.7988**	26.0084***	–	11.4642**	1.3432
	(0.0334)	(0.0000)		(0.0032)	(0.5109)
Capital	1.3899	1.2867	2.8575	–	0.2602
	(0.4991)	(0.5255)	(0.2396)		(0.8780)
Human Capital Index	0.5281	12.89638***	0.0383	11.11386**	–
	(0.7679)	(0.0016)	(0.9810)	(0.0039)	
NAMIBIA					
Independent variables	GDP	Dependent variables			
		Exports	Imports	Capital	Human Capital Index
GDP	–	3.4550	0.5672	1.9244	2.6272
		(0.1777)	(0.7531)	(0.3821)	(0.2689)
Exports	3.8917	–	2.7698	5.5751*	2.3611
	(0.1429)		(0.2503)	(0.0616)	(0.3071)
Imports	9.8119***	5.3902*	–	1.9112	2.1869
	(0.0074)	(0.0675)		(0.3846)	(0.3351)
Capital	2.5717	10.6577***	2.2471	–	1.1419
	(0.2764)	(0.0048)	(0.3251)		(0.5650)
Human Capital Index	12.8811***	8.6455**	0.0973	1.5942	–
	(0.0016)	(0.0133)	(0.9525)	(0.4506)	
SOUTH AFRICA					
Independent variables	GDP	Dependent variables			
		Exports	Imports	Capital	Human Capital Index
GDP	–	9.1837**	15.1925***	16.6630***	4.9663*
		(0.0101)	(0.0005)	(0.0002)	(0.0835)
Exports	1.8618	–	1.0197	0.4882	2.2600
	(0.3942)		(0.6006)	(0.7834)	(0.3230)
Imports	11.7859***	2.5344	–	8.4489**	0.6773
	(0.0028)	(0.2816)		(0.0146)	(0.7127)
Capital	3.3266	3.6069	2.9936	–	6.2133**
	(0.1895)	(0.1647)	(0.2238)		(0.0448)
Human Capital Index	5.6931*	0.3267	3.4252	9.5724***	–
	(0.0580)	(0.8493)	(0.1804)	(0.0083)	

(*continued*)

Table 1. Continued.

BOTSWANA					
		Dependent variables			
Independent variables	GDP	Exports	Imports	Capital	Human Capital Index
ESWATINI					
Independent variables	GDP	Dependent variables Exports	Imports	Capital	Human Capital Index
GDP	–	0.2750	0.2136	8.8285**	0.6044
		(0.8715)	(0.8987)	(0.0121)	(0.7392)
Exports	8.8489**	–	0.2016	1.6781	1.9762
	(0.0120)		(0.9041)	(0.4321)	(0.3723)
Imports	1.6977	2.5501	–	2.4595	1.3807
	(0.4279)	(0.2794)		(0.2924)	(0.5014)
Capital	6.4676**	6.5135**	9.0413**	–	4.2728
	(0.0394)	(0.0385)	(0.0109)		(0.1181)
Human Capital Index	1.3436	0.9313	3.6910	2.9072	–
	(0.5108)	(0.6277)	(0.1579)	(0.2337)	

Values in parentheses are p-values.
***denotes rejection of null hypothesis at 1% significance level, **denotes rejection of null hypothesis at 5% significance level and *denotes rejection at 10% significance level.

relationship from economic growth to exports is reported for Lesotho and South Africa; there is a uni-directional causality from exports to economic growth for Eswatini. Finally, there is no significant causal relationship between exports and GDP in Namibia.

On the import-economic growth nexus, results show that there is a bi-directional Granger causality between imports and GDP for Lesotho and South Africa. One-way Granger causality from imports to GDP is reported for Namibia and from GDP to imports for Lesotho. No significant causal relationship between imports and economic growth is reported for Botswana.

5. Conclusion

This study builds comparison of the trade-growth nexus within the Southern African Customs Union and reveals the following overall results on the causality between exports, imports, and economic growth in SACU countries:

- There is a bi-directional Granger causality between exports and GDP per capita in Botswana.
- There is evidence of export-led growth for Eswatini.
- GDP Granger causes exports in Lesotho and South Africa, validating the growth-led exports hypothesis. There is however no evidence of export-led growth hypothesis.
- There is no Granger causality between exports and economic growth in Namibia.
- There is a bi-directional Granger causality between imports and economic growth for Lesotho and South Africa.
- Uni-directional Granger causality from imports to economic growth exists for Namibia.
- There is no Granger causality between imports and economic growth for Botswana and Eswatini.

Empirical findings on the causal relationship remain inconsistent that leads to difficulties in making economic policy suggestions, especially if nations have formed a union and

must adopt common trade policies. Nonetheless, the following policy recommendations are proposed based on the reduced-form empirical findings of this study. Botswana and Eswatini should adopt export promotion strategies in order to promote economic growth. Furthermore, policy makers in Botswana should increase the production of non-export commodities to boost exports. The growth-led exports hypothesis results for Lesotho and South Africa suggest that the policy makers in both countries should consider expanding their domestic market production to boost exports.

The validation of the import-led growth hypothesis in Lesotho, Namibia and South Africa suggests that these countries should continue to develop policies aimed at promoting imports to accelerate economic growth. These countries can improve their respective GDP growth rates by absorbing latest technological innovations through increased imports of capital goods. Policy makers may therefore encourage imports of capital goods through incentives and reconsideration of trade restrictions. Botswana and Eswatini can re-assess the composition of their imports. Both countries can still benefit by adapting from the imports of final consumer goods to importing goods and services which incorporate new foreign technology. Domestic technology and productivity will be improved leading to output growth.

Domestic growth strategies aimed at creating a conducive environment for the local production of mostly imported consumption goods, will enable the countries to focus on the absorption of the foreign advanced technology and intermediate goods which are imperative for their economic development.

The lack of significant positive correlation between exports and economic growth for Namibia and imports and economic growth for Botswana and Eswatini might be due to economic size, being lower than the threshold enabling the country to reap benefits from international trade. It is therefore suggested that these countries adopt policies aimed at boosting human capital and infrastructural development in order to expand the domestic economy to reach the threshold level required to reap the benefits of international trade.

Overall, the SACU region requires growth strategies that will promote the development of the non-commodity manufacturing exports as well as other structural reforms such as improving job skills to improve productivity and efficiency. Furthermore, strengthened institutions and sound economic structural reforms will make positive contributions towards the respective country's economic growth, allowing the economy to reach the threshold to enable them to reap the benefits of international trade.

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