THE NEXUS BETWEEN IMPORTS AND ECONOMIC GROWTH IN SOUTH AFRICA: A DISAGGREGATED APPROACH

Mercy. T. Musakwa
University of South Africa
tsile.musa@gmail.com
P. Vacu
University of South Africa
Vacunp@unisa.ac.za
N. Odhiambo
University of South Africa
odhianm@unisa.ac.za / nmbaya99@yahoo.com

Abstract
In this study, the causal relationship between disaggregated imports and economic growth is investigated in South Africa. The study was motivated by the need to establish how South Africa can achieve the growth trajectory that is much needed by the country to achieve sustainable development goals. The study applied the autoregressive distributed lag (ARDL) approach to cointegration and the ECM-based Granger causality test on annual time series data covering the period from 1988 to 2021. The findings confirmed a bidirectional causality between all measures of imports and economic growth, thereby confirming the significance of imports in buttressing economic growth. The findings point to the important role that imports play in achieving sustainable growth and development.

Keywords
Imports; South Africa; intermediate goods; consumer goods, capital goods, economic growth, autoregressive distributed lag (ARDL), causality

JEL Classification
F41; F43; C32

Introduction

The role of imports on economic growth has received little attention from researchers in recent decades. Instead, export and economic growth studies have taken center stage among researchers. Most of the studies support the export-growth hypothesis, which has resulted in policymakers focusing on policies that support exports, and less support for imports. Imports are viewed as a drain on the economy; hence most countries have implemented policies to control imports. Among the few studies that have examined the causality between imports and economic growth, mixed results have been confirmed. Some studies found a bidirectional causality (see, Cetintas and Barisik, 2009; Ahmed, Cheng and Messinis, 2011; Mishra, 2012; Chang, Simo-Kengne and Gupta, 2014; Aluko and Abadale, 2020); some studies support the export-growth hypothesis (see, Bakari and Mabrouki, 2017; Aluko and Abadale, 2020; Usman and Bashir, 2022); some confirmed import-growth hypothesis (see, Chang, Simo-Kengne and Gupta, 2014; Aluko and Abadale, 2020); and yet some found no causal relationship between the two (see Awokuse, 2008; Rani and Kumar, 2018; Aluko and Abadale, 2020). The mixed results from the extant literature make generalisation of the results from different studies inappropriate in informing South Africa's import-economic growth policies. The objective of this study, therefore, is to

establish if the import-led growth hypothesis holds for South Africa. This study investigates the causal relationship between economic growth and imports using aggregated and disaggregated import data: consumer goods, intermediate goods, and capital goods. The use of disaggregated data will shed light on the categories of imports that are beneficial to economic growth in South Africa and those that are not.
The study is divided as follows; section 2 provides a brief overview of imports in South Africa; section 3 outlines the empirical studies that have investigated the relationship between economic growth and imports; section 4 describes the estimation techniques, and data analysis and presentation of empirical findings are outlined in section 5. Section 6 concludes the study.

An overview of South Africa's imports

Imports contribute significantly to South Africa's economy, accounting for almost 30% of the total gross domestic product. The country's reliance on imports can be seen through the increasing amount of goods and services imported into the country and the widening trade deficit. The total value of imports of goods and services has increased over the last decade from $96.8 billion in 2010 to $113.1 billion in 2021 (South African Reserve Bank, 2021). The increase is mainly driven by, among other factors, the increase in the imports of mining and manufacturing products (South African Reserve Bank, 2021). In terms of the trade balance, the country recorded a positive trade balance in the early years of the post-apartheid period (UNCTADSTAT, 2015). However, the dominance of exports started declining due to changes in the rand exchange rate as it is one of the factors that contributed to the high level of exports in the country (Tips, 2006). In 2004, imports started growing faster than exports, which, in turn, led to a trade deficit. According to the Industrial Development Corporation (2013), the import increase was due to the increase in household consumption expenditure and public sector infrastructure investment during the same period. The increase in the cost of production due to the economic recession in 2008 also compounded the trade deficit and the increase in the import penetration ratio (Vacu, 2019). In 2020, the country started recording a surplus, despite the negative effect of covid-19 on local production. The importance of imports for economic growth in South Africa is also confirmed by the rising import penetration ratio, which measures the share of domestic demand that is satisfied by imports. Figure 1 shows trends of import penetration ratio over the period from 1995 to 2021.
As shown in Figure 1, the import penetration ratio has increased over the years with fluctuations. In 1995, the country relied on imports for the satisfaction of 20% of its domestic demand. This increased to 33% in 2008 and declined marginally to 27% in 2021. According to Vacu (2019), the increase in the import penetration ratio in South Africa was driven by the manufacturing sector, as manufactured goods make up a large percentage of imports in the country.
South Africa trades with both developing and developed countries in the world, with developed countries being the main source of its imports. Estimates from UNCTADSTAT (2021) show that the top six sources include China, Germany, India, the United States of America, the Netherlands, and Italy, with China accounting for the largest share (30%), followed by Germany (14%). In terms of merchandise imports, South Africa's imports are largely manufactured goods, which account for 83.3%, followed by food items at 7.5% (UNCTADSTAT, 2021).

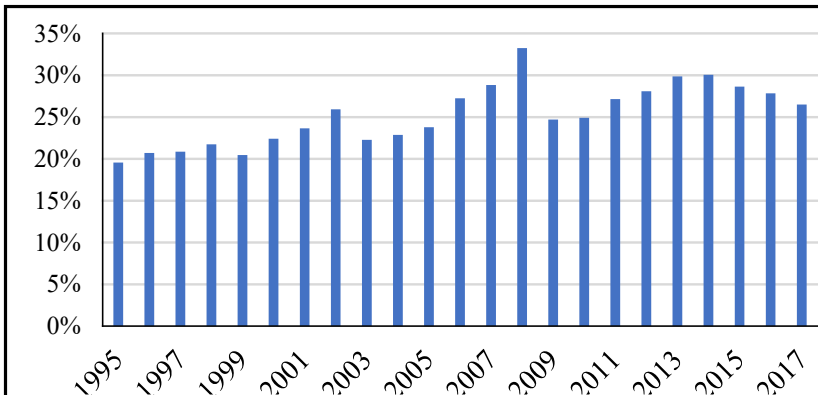

Figure 1: South Africa's Import Penetration Ratio (1995-2021)

Source: World bank database and author's computation

In terms of policy development, South Africa has gone through various trade policy reforms since the country's accession to democracy. This has led to a number of import-related policy reforms, such as the removal of quantitative restrictions and a reduction in the number of *ad valorem* tariffs. According to Vacu (2019), these reforms have allowed the country to actively participate in international trade by establishing bilateral, unilateral, and intra-regional trade agreements with other countries.

Literature on the Import-Growth Nexus

The causal link between imports and economic growth has received little attention from both researchers and policymakers. The existing empirical literature confirm mixed results, with some studies supporting the existence of a causal link between the two variables, while some confirmed that there is no causal link. The results from studies that found a causal link between imports and economic growth can be grouped into three categories. The first category comprises studies that support the import-led hypothesis (Bakari and Mabrouki, 2017; Aluko and Abadale, 2020). This includes studies such as Ahmed, Cheng and Messinis (2011), who tested the import-led growth hypothesis in Sub-Saharan African countries, particularly Ghana, Kenya, Nigeria, South Africa, and Zambia. The study employed the Granger causality test and found a unidirectional relationship running from imports to economic growth in the case of Kenya, Nigeria, and Zambia. Using the autoregressive distributed lag model (ARDL) and Granger causality test and annual data covering the period 1971 to 2009, Islam, Hye, and Shahbaz (2012) also found similar results in 62 selected countries. Bakari and Mabrouki (2017) carried out a similar study for Pamana. The study applied the Granger causality test ON time series data covering the period from 1980 to 2015. The findings confirmed a unidirectional relationship between running from imports to economic growth. Aluko and Abadale (2020) examined the import-economic growth nexus in 26 selected African countries from 1990 to 2015. The study employed the Toda-Yamamoto Granger causality test and found similar results for the case of Angola, Mauritius, and Tunisia. Usman and Bashir (2022) used the BC Granger causality test in the case of China, India, and G7 countries and confirmed similar results.

The second category includes studies that confirmed the existence of a causal link running from economic growth to imports. This group comprises studies such as, among others, Chang, Simo-Kengne, and Gupta (2014), who carried out a similar

study in nine provinces of South Africa. The study employed the Panel Granger Causality test and used annual data covering the period 1996 to 2011. The findings confirmed a unidirectional causal relationship between the two variables flowing from economic growth to imports in Gauteng, Mpumalanga, Northwest, and Western Cape. Aluko and Abadale (2020) also found that economic growth granger causes imports growth in the case of Burundi, Congo republic, Ghana, Kenya, Mali, South Africa, and Togo.

Studies in the third category found a bidirectional relationship between the two variables. This includes, among others, studies such as Ramos (2001), who examined the causal link between imports and economic growth in Portugal. The study employed annual data covering the period from 1865 to 1998. The findings confirmed a feedback effect between the two variables. Similar results were confirmed by Awokuse (2008), who carried out a similar study using the case of Argentina and Colombia. The study applied the Granger causality test on time series data covering the period from January 1993, April 2000 in the case of Argentina, and January 1994, to April 2002 in the case of Colombia. Cetintas and Barisik (2009) also found a feedback effect in the case of 13 transition economies. The study applied a panel Granger causality on time series data covering the period from February 1995 to April 2006. For Japan and South Korea, Zang and Baimbridge (2011) also found similar results. The study applied the Granger causality test on annual data covering the period from 1963 to 2003 for South Korea and 1957 to 2003 for Japan. Ahmed, Cheng, and Messinis (2011) found a similar feedback effect in South Africa. In the case of India, Mishra (2012) studied the dynamics of the relationship between imports and economic growth from 1970 to 1971 and 2009–2010 using the granger causality test and confirmed a feedback relationship between imports and economic growth. Rahman and Shahbaz (2013) examined the causal link between the two variables in Pakistan over the period from 1990 to 2010. The study used the autoregressive distributed lag (ARDL) bounds testing approach and VECM Granger causality approach. The findings from the granger causality test suggested the existence of a bidirectional causal relationship between the two variables, with imports having a stronger effect on economic growth. This concurs with the results from Chang, Simo-Kengne, and Gupta (2014) in the case of KwaZulu Natal in South Africa and Aluko and Abadale (2020) in the case of Swaziland.

Studies that found no causal relationship between the two variables include studies such as, among others, Awokuse (2008), who tested the import-led growth hypotheses for Peru using the Granger causality test over the period January 1990 to April 2002. Rani and Kumar (2018) also carried out a similar study for BRICS from 1967 to 2014. The study used the Panel Granger Causality test and found no causal relationship between the two variables. The findings from Aluko and Abadale (2020) confirmed the same results for Benin, Botswana, Cameroon, Egypt, Gambia, Guinea-Bissau, Madagascar, Malawi, Morocco, Namibia, Nigeria, Senegal, Sierra Leone, Tanzania, and Uganda. A similar finding was also confirmed by Chang, Simo-Kengne, and Gupta (2014) in the case of the Eastern Cape, Limpopo, Free State, and Northern Cape of South Africa.

Table 1: A Summary of Empirical Studies on The Causality Between Economic Growth and Imports.

Author and date	Country	Title	Econometric Techniques and Period	Results
Empirical Studies that Found a Unidirectional Causal Relationship Running from Imports to Economic Growth				

Ahmed, Cheng and Messinis (2011)	Sub-Saharan countries (Kenya, Nigeria and Zambia)	The role of exports, FDI and imports in development: Evidence from Sub-Saharan African countries	ECM based Granger Causality test	Imports - Economic growth
Islam, Hye and Shahbaz (2012)	62 selected countries	Import-economic growth nexus: ARDL approach to cointegration	Autoregressive distributed lag model (ARDL) and ECM based Granger causality test 1971 to 2009	Imports - economic growth
Bakari and Mabrouki (2017)	Pamana	Impact of Exports and Imports on Economic Growth: New Evidence From Panama	Granger Causality test 1980 to 2015	Imports - economic growth
Aluko and Obadale (2020)	26 African countries (Angola Mauritius and Tunisia)	Import-economic growth nexus in selected African countries: An application of the Toda-Yamamoto Granger non-causality test	Toda-Yamamoto Granger non-causality test 1990-2015	Imports - economic growth
Empirical Studies that Found a Causal Relationship Running from Economic Growth to Imports				
Chang, Simo-Kengne and Gupta (2014)	South Africa-Gauteng, Mpumalanga, Northwest, and Western Cape	The Causal Relationship Between Imports and Economic Growth in the Nine Provinces in South African: Evidence from Panel Granger Causality Tests	Panel Granger Causality Test 1996 to 2011	Economic growth-Imports
Aluko and Abadale (2020)	26 African countries (Burindi, Congo republic, Ghana, Kenya, Mali, South Africa and Togo)	Import-economic growth nexus in selected African countries: An application of the Toda-Yamamoto Granger non-causality test	Toda-Yamamoto Granger non-causality test 1990-2015	Economic growth-Imports
Empirical Studies that Found a Bidirectional Causal Relationship Between Imports and Economic Growth to Imports				
Ramos (2001)	Portugal	Exports, imports, and economic growth in Portugal: evidence from causality and cointegration analysis	ECM based Granger causality test 1865 to 1998	Imports-economic growth Economic growth - Imports
Awokuse (2008)	Argentina and Colombia	Trade openness and economic growth: Is growth export-led or import-led?	ECM based Granger causality test January 1993, April 2000 and January 1994, to April 2002	Imports-economic growth Economic growth - Imports
Cetintas and Barisik (2009)	13 Transition economies	Export, Import and Economic Growth: The Case	Panel Granger causality 1995: February to	Imports-economic growth

		of Transition Economies	2006: April	Economic growth - Imports
Zang and Baimbridge (2011)	South Korea and Japan	Exports, imports and economic growth in South Korea and Japan: A tale of two economies	Granger causality test 1963 to 2003 and 1957 to 2003	Imports-economic growth Economic growth - Imports
Ahmed, Cheng and Messinis (2011)	Sub-Saharan countries-(South Africa)	The role of exports, FDI and imports in development: Evidence from Sub-Saharan African countries	Granger Causality test	Imports-economic growth Economic growth - Imports
Rahman and Shahbaz (2013)	Pakistan	Do Imports and Foreign Capital Inflows Lead Economic Growth? Cointegration and Causality Analysis in Pakistan.	Granger Causality test 1990 to 2010	Imports-economic growth Economic growth - Imports
	Empirical Studies that Found a Bidirectional Causal Relationship Between Imports and Economic Growth to Imports			
Awokuse (2008)	Peru	Trade openness and economic growth: Is growth export-led or import-led?	Granger causality test January 1993, April 2000 and January 1994, to April 2002	No causal relationship
Chang, Simo-Kengne and Gupta (2014)	South Africa-KwaZulu Natal	The Causal Relationship Between Imports and Economic Growth in the Nine Provinces in South African: Evidence from Panel Granger Causality Tests	Panel Granger Causality Test 1996 to 2011	Economic growth-Imports
Rani and Kumar (2018	BRICS	Is There an Export- or Import-led Growth in BRICS Countries? An Empirical Investigation	Panel Granger Causality 1967 and 2014	No causal relationship
Aluko and Abadale (2020)	Benin, Botswana, Cameroon, Egypt, Gambia, Guinea-Bissau, Madagascar, Malawi, Morocco, Namibia Nigeria, Senegal, Sierra Leone, Tanzania and Uganda	Import-economic growth nexus in selected African countries: An application of the Toda-Yamamoto Granger non-causality test	Toda-Yamamoto Granger non-causality test 1990-2015	No causal relationship

Methodology

Model specification

This study used the autoregressive distributed lag (ARDL) approach to cointegration and the ECM-based Grander causality framework to examine the causal relationship between economic growth and imports. The ARDL approach was extended by Pesaran, Smith, and Shin (2001). Some of the benefits of using this approach in this study is that; the results obtained are in the short and long run- which is important for policies that are time specific for South Africa. The approach is also robust in a small sample (Solarin and Shahbaz, 2013), proving to be appropriate for this study. The ARDL approach does not require all variables to be integrated of the same order (see Pesaran *et al*., 2001).
The models used in this study are specified as follows:

GDPP =f(IP,GFCF, EXCH, IR)

Where IP captures import proxies measured by consumer goods (CG) in Model 1, Intermediate goods (IG) in Model 2, capital goods (KG) in Model 3, and total imports (TI) in Model 4; gross fixed capital formation (GFCF); exchange rate (EXCH); Gross Domestic Product per capita (GDPP); and interest rate (IR). The ARDL model specification of this model is given in equations 1 to 5

$$\begin{aligned}\Delta IP_{mt} = \varphi_0 &+ \sum_{i=1}^{n} \varphi_{1i}\,\Delta IP_{mt-i} + \sum_{i=0}^{n} \varphi_{2i}\Delta\, GFCF_{t-i} + \sum_{i=0}^{n} \varphi_{3i}\,\Delta EXCH_{t-i} \\ &+ \sum_{i=0}^{n} \varphi_{4i}\,\Delta GDPP_{t-i} + \sum_{i=0}^{n} \varphi_{5i}\,\Delta IR_{t-i} + \beta_1 IP_{mt-1} + \beta_2 GFCF_{mt-1} \\ &+ \beta_3 EXCH + \beta_5 GDPP_{t-1} + \beta_3 IR \\ &+ \mu_{1t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)\end{aligned}$$

$$\begin{aligned}GFCF_t = \varphi_0 &+ \sum_{i=0}^{n} \varphi_{1i}\,\Delta IP_{mt-i} + \sum_{i=1}^{n} \varphi_{2i}\Delta\, GFCF_{t-i} + \sum_{i=0}^{n} \varphi_{3i}\,\Delta EXCH_{t-i} \\ &+ \sum_{i=0}^{n} \varphi_{4i}\,\Delta GDPP_{t-i} + \sum_{i=0}^{n} \varphi_{5i}\,\Delta IR_{t-i} + \beta_1 IP_{mt-1} + \beta_2 GFCF_{mt-1} \\ &+ \beta_3 EXCH + \beta_5 GDPP_{t-1} + \beta_3 IR \\ &+ \mu_{2t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)\end{aligned}$$

$$\begin{aligned}EXCH_t = \varphi_0 \sum_{i=0}^{n} &\varphi_{1i}\,\Delta IP_{mt-i} + \sum_{i=0}^{n} \varphi_{2i}\Delta\, GFCF_{t-i} + \sum_{i=1}^{n} \varphi_{3i}\,\Delta EXCH_{t-i} \\ &+ \sum_{i=0}^{n} \varphi_{4i}\,\Delta FDI_{t-i} + \sum_{i=0}^{n} \varphi_{5i}\,\Delta IR_{t-i} + \beta_1 IP_{mt-1} + \beta_2 GFCF_{mt-1} \\ &+ \beta_3 EXCH + \beta_5 GDPP_{t-1} + \beta_3 IR \\ &+ \mu_{3t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)\end{aligned}$$

$$GDPP_t = \varphi_0 + \sum_{i=0}^{n} \varphi_{1i}\,\Delta IP_{mt-i} + \sum_{i=0}^{n} \varphi_{2i}\Delta\, GFCF_{t-i} + \sum_{i=0}^{n} \varphi_{3i}\,\Delta EXCH_{t-i} + \sum_{i=1}^{n} \varphi_{4i}\,\Delta GDPP_{t-i} + \sum_{i=0}^{n} \varphi_{5i}\,\Delta IR_{t-i} + \beta_1 IP_{mt-1} + \beta_2 GFCF_{mt-1} + \beta_3 EXCH + \beta_5 GDPP_{t-1} + \beta_3 IR + \mu_{4t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

$$IR_t = \varphi_0 + \sum_{i=0}^{n} \varphi_{1i}\,\Delta IP_{mt-i} + \sum_{i=0}^{n} \varphi_{2i}\Delta\, GFCF_{t-i} + \sum_{i=0}^{n} \varphi_{3i}\,\Delta EXCH_{t-i} + \sum_{i=0}^{n} \varphi_{4i}\,\Delta GDPP_{t-i} + \sum_{i=1}^{n} \varphi_{5i}\,\Delta IR_{t-i} + \beta_1 IP_{mt-1} + \beta_2 GFCF_{mt-1} + \beta_3 EXCH + \beta_5 GDPP_{t-1} + \beta_3 IR + \mu_{5t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

φ_0 is a constant; $\varphi_1 - \varphi_5;\ \beta_1 - \beta_5$ are coefficients; and $\mu_1 - \mu_5$ are error terms.

Equation 6 -10 specifies the ECM model

$$\Delta IP_{mt} = \varphi_0 + \sum_{i=1}^{n} \varphi_{1i}\,\Delta IP_{mt-i} + \sum_{i=1}^{n} \varphi_{2i}\Delta\, GFCF_{t-i} + \sum_{i=1}^{n} \varphi_{3i}\,\Delta EXCH_{t-i} + \sum_{i=1}^{n} \varphi_{4i}\,\Delta GDPP_{t-i} + \sum_{i=1}^{n} \varphi_{5i}\,\Delta IR_{t-i} + \vartheta_1 ECM_{t-1} + \gamma_{1t} \ldots\ldots\ldots\ldots\ldots\ldots (6)$$

$$\Delta GFCF_t = \varphi_0 + \sum_{i=1}^{n} \varphi_{1i}\,\Delta IP_{mt-i} + \sum_{i=1}^{n} \varphi_{2i}\Delta\, GFCF_{t-i} + \sum_{i=1}^{n} \varphi_{3i}\,\Delta EXCH_{t-i} + \sum_{i=1}^{n} \varphi_{4i}\,\Delta GDPP_{t-i} + \sum_{i=1}^{n} \varphi_{5i}\,\Delta IR_{t-i} + \vartheta_2 ECM_{t-1} + \gamma_{2t} \ldots\ldots\ldots\ldots\ldots\ldots (7)$$

$$\Delta EXCH_t = \varphi_0 + \sum_{i=1}^{n} \varphi_{1i}\,\Delta IP_{mt-i} + \sum_{i=1}^{n} \varphi_{2i}\Delta\, GFCF_{t-i} + \sum_{i=1}^{n} \varphi_{3i}\,\Delta EXCH_{t-i} + \sum_{i=1}^{n} \varphi_{4i}\,\Delta GDPP_{t-i} + \sum_{i=1}^{n} \varphi_{5i}\,\Delta IR_{t-i} + \vartheta_3 ECM_{t-1} + \gamma_{3t} \ldots\ldots\ldots\ldots\ldots\ldots (8)$$

$$\Delta GDPP_t = \varphi_0 + \sum_{i=1}^{n} \varphi_{1i}\, \Delta IP_{mt-i} + \sum_{i=1}^{n} \varphi_{2i} \Delta\, GFCF_{t-i} + \sum_{i=1}^{n} \varphi_{3i}\, \Delta EXCH_{t-i} + \sum_{i=1}^{n} \varphi_{4i}\, \Delta GDPP_{t-i} + \sum_{i=1}^{n} \varphi_{5i}\, \Delta IR_{t-i} + \vartheta_4 ECM_{t-1} + \gamma_{4t} \ldots\ldots\ldots\ldots\ldots\ldots (9)$$

$$\Delta IR_t = \varphi_0 + \sum_{i=1}^{n} \varphi_{1i}\, \Delta IP_{mt-i} + \sum_{i=1}^{n} \varphi_{2i} \Delta\, GFCF_{t-i} + \sum_{i=1}^{n} \varphi_{3i}\, \Delta EXCH_{t-i} + \sum_{i=1}^{n} \varphi_{4i}\, \Delta GDPP_{t-i} + \sum_{i=1}^{n} \varphi_{5i}\, \Delta IR_{t-i} + \vartheta_5 ECM_{t-1} + \gamma_{5t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (10)$$

ECM = Error term

$\vartheta_1 - \vartheta_5$ are the error correction term coefficients and $\gamma_1 - \gamma_t$ are error terms.

Data sources and definition of variables

This paper investigates the causal relationship between imports and economic growth using disaggregated import data. Import of consumer goods (CG), intermediate goods (IG), capital goods (KG), and total imports (TI) were retrieved from Quantec easy data. Gross domestic product per capita (GDPP), exchange rate (EXCH), gross fixed capital formation (GFCF), and interest rates were extracted from World Development Indicators. Data sources for the employed variables are presented in table 2 below.

Empirical Results

Although the ARDL does to require unit root testing, in this study, Dickey-Fuller Generalised Least Square (DF-GLS) (Elliott *et al*., 1996.) and Phillip and Perron (PP)(1988) unit root tests were carried out. This was done to ascertain that the variables included in the four models are integrated of order zero or one. The ARDL falls away if variables have a high order of integration above one.

Table 2: Unit root Test

Dickey-Fuller Generalised Least Square (DF-GLS)			**Phillip and Perron (PP) Root Test**	
Variable	Stationarity of all Variables in Levels	Stationarity of all variables in First Difference	Stationarity of all Variables in Levels	Stationarity of all variables in First Difference

	Without Trend	With Trend	Without Trend	With Trend	Without Trend	With Trend	Without Trend	With Trend
CG	-0.192	-2.072	-5.259***	-5.160***	-0.397	-1.338	-4.838***	-4.788***
IG	-0.562	-2.542	-5.847***	-5.638***	-0.680	-2.532	-6.053***	-5.862***
KG	-0.934	-1.510	-4.980***	-4.946***	-1.267	-1.380	-4.838***	-4.788***
TI	-0.535	-2.153	-5.461***	-5.275***	-0.768	-2.138	-5.326***	-5.185***
GFCF	-2.400	-1.403	-3.397***	-3.728***	-1.649	-1.648	-3.928***	-3.860**
EXCH	-0.855	-2.781	-4.842***	-4.938***	-0.933	-2.556	-6.441***	-6.318**
FDI	-3.364	-3.260	-6.895***	-7.081***	-3.397**	-3.260*	-6.895**	-6.852***
IR	-0.904	-2.481	-5.724***	-6.372***	-2.659	-2.717	-6.460***	-6.983***

Note: *, ** and *** denote stationarity at 10%, 5% and 1% significance levels, respectively.

Cointegration Test

After confirming the order of integration, cointegration is tested on Models 1 -4 functions. When the calculated F-statistics is above the upper bound, cointegration is confirmed; if the F-statistics is below the lower bound, no long-run relationship is confirmed; and when the F-statistics fails in between the upper and lower bound, the results are inconclusive. In this study, this outcome is treated as no cointegration confirmation. Cointegration results are presented in Table 3.

Table 3: Cointegration Results

Dependent Variable	Function	F-Statistic	Cointegration Status
Panel 1: Model 1 (Consumer Goods as a Measure of Imports)			
CG	F(CG| GDPP,GFCF,EXCH, IR)	4.739**	Cointegrated
GFCF	F(GFCF| CG, GDPP,EXCH, IR)	3.903*	Cointegrated
EXCH	F(EXCH| CG, GDPP,GFCF, IR)	1.365	Not Cointegrated
GDPP	F(GDPP| GFCF,EXCH, CG, IR)	3.651*	Cointegrated
IR	F(IR| GFCF,EXCH, GDPP, CG)	2.383	Not cointegrated
Panel 2: Model 2 (Intermediate Goods as a Measure of Imports)			
IG	F(IG| GDPP,GFCF,EXCH, IR)	7.705***	Cointegrated
GFCF	F(GFCF| IG, GDPP,EXCH, IR)	3.015	Not Cointegrated
EXCH	F(EXCH| IG, GDPP,GFCF, IR)	4.3003**	Cointegrated
GDPP	F(GDPP| GFCF,EXCH, IG, IR)	4.077**	Cointegrated
IR	F(IR| GFCF,EXCH, GDPP, IG)	2.237	Not Cointegrated
Panel 3: Model 3 (Capital Goods as a Measure of Imports)			
KG	F(KG| GDPP,GFCF,EXCH, IR)	7.359***	Cointegrated
GFCF	F(GFCF| KG, GDPP,EXCH, IR)	1.827	Not cointegrated

EXCH	F(EXCH| KG, GDPP,GFCF, IR)		2.744		Not Cointegrated	
GDPP	F(GDPP| GFCF,EXCH, KG, IR)		7.111***		Cointegrated	
IR	F(IR| GFCF,EXCH, GDPP, KG)		2.045		Not cointegrated	
Panel 4 : Model 4 (Total Imports as a Measure of Imports)						
TI	F(IG| GDPP,GFCF,EXCH, IR)		6.005**		Cointegrated	
GFCF	F(GFCF| IG, GDPP,EXCH, IR)		3.423		Not cointegrated	
EXCH	F(EXCH| IG, GDPP,GFCF, IR)		1.942		Not cointegrated	
GDPP	F(GDPP| GFCF,EXCH, IG, IR)		4.839**		Cointegrated	
IR	F(IR| GFCF,EXCH, GDPP, IG)		4.779**		Cointegrated	
Asymptotic Critical Values (unrestricted intercept and no trend)						
Critical Values	1%		5%		10%	
	I (0)	I (1)	I (0)	I (1)	I (0)	I (1)
	3.74	5.06	2.86	4.01	2.45	3.52

Note: *, ** and *** denote stationarity at 10%, 5% and 1% significance levels, respectively.

Causality Results

Table 4: ECM-Based Causality Results for Models 1-4

Panel 1		**Model 1: Consumer Goods as Disaggregated Measure of Imports**					**Model 2: Intermediate Goods as Disaggregated Measure of Imports**					
	ΔIP	ΔGFCF	ΔEXCH	ΔGDPP	ΔIR	ECM (t-	ΔIP	ΔGFCF	ΔEXCH	ΔGDPP	ΔIR	ECM (t-

						stat)						stat)
ΔIP	-	8.678*** [0.006]	9.051*** [0.006]	4.936*** [0.016]	0.011 [0.914]	-0.479*** [-5.216]	-	9.178*** [0.007]	4.923** [0.035]	5.652*** [0.015]	1.988 [0.170]	-0.480*** [-6.405]
ΔGFCF	3.327* [0.081]	-	8.793*** [0.007]	9.679*** [0.004]	3.738** [0.026]	-	1.517 [0.229]	-	4.164* [0.051]	5.346** [0.029]	4.144* [0.052]	-
ΔEXCH	3.882** [0.035]	4.103** [0.029]	-	0.715 [0.408]	1.682 [0.207]	-	3.405** [0.050]	4.260** [0.026]	-	2.856 [0.104]	1.012 [0.324]	
ΔGDPP	9.834*** [0.001]	7.143** [0.013]	8.782*** [0.006]	-	0.034 [0.855]	-0.229** [-2.260]	4.676** [0.001]	6.903** [0.014]	4.228** [0.050]	-	0.801 [0.379]	-0.351*** [-3.133]
IR	0.394 [0.536]	3.824** [0.038]	0.031 [0.861]	0.246 [0.877]	-	-	1.541 [0.226]	4.752** [0.018]	1.267 [0.299]	2.748 [0.110]	-	-
Panel 2		**Model 3: Capital Goods as Disaggregated Measure of Imports**					**Model 4: Total Imports as an Aggregate Measure of Imports**					
	ΔIP	ΔGFCF	ΔEXCH	ΔGDPP	ΔIR		ΔTI	ΔGFCF	ΔEXCH	ΔGDPP	ΔIR	
ΔIP	-	4.904*** [0.008]	4.162*** [0.007]	9.087*** [0.006]	0.355 [0.560]	-0.290*** [-5.810]	-	8.636*** [0.004]	9.233*** [0.005]	6.320*** [0.000]	1.928 [0.176]	-0.579*** [-6.971]

ΔGFCF	0.303 [0.587]	-	3.403* [0.050]	5.026**	3.837* [0.036]	-	1.570 [0.221]	-	4.693** [0.039]	4.904** [0.035]	4.065* [0.054]	-
ΔEXCH	7.996*** [0.002]	7.364*** [0.003]	-	0.785 [0.384]	1.188 [0.322]	-	4.976** [0.016]	5.454** [0.011]	-	0.203 [0.656	10.919 [0.413]	-
ΔGDPP	6.810*** [0.000]	3.522* [0.071]	9.458*** [0.005]	-	1.336 [0.258]	-0.537*** [-7.898]	5.682** [0.012]	8.584*** [0.007]	7.259** [0.012]	-	0.834 [0.369]	-0.603* [-6.623]
IR	0.837 [0.369]	3.961** [0.032]	1.117 [0.3432]	1.644 [0.212]	-	-	1.018 [0.323]	4.491** [0.022]	1.155 [0.331]	1.934 [0.176]	-	-

Note: *, ** and *** denote stationarity at 10%, 5% and 1% significance levels, respectively.

The results reported in panel 1 of table 4 for model 1 confirm a bidirectional causality between consumer goods imports and GDP per capita in both the short and long run. These results are consistent when imports are measured by intermediate goods. The results confirm a reinforcing effect between consumer goods and GDP per capita and intermediate goods and GDP per capita, irrespective of the timeframe considered. An increase in GDP per capita stimulates more imports of consumer goods and, in return, an increase in the import of intermediate and consumer goods, leading to improved household welfare. These results are not unique to South Africa alone. Aluko and Abadale (2020) found the same results in a study on Swaziland; Rahman and Shahbaz (2013), in a study on Pakistan, confirmed the same results as Ahmed, Cheng, and Messinis (2011) in a study on sub-Saharan African countries.

Other results presented for model 1 confirmed a :i) bidirectional causality between imported consumer goods and gross fixed capital formation in the short run and a unidirectional causality from GFCF to imported consumer goods in the long run; ii) a bidirectional causality between imported consumer goods and exchange rate in the short run and a unidirectional causality from imported consumer goods to exchange rate in the long run; iii) no causality was conformed between imported consume goods and interest rate, implying in South Africa, consumers do not rely on borrowed funds to finance imported products; iv) a bidirectional causality between GDPP and gross fixed capital formation, supporting the major role that is played by investment in gross fixed capital formation in buttressing economic growth; v) a unidirectional causality from exchange rate to GDPP in the short run and the long run; vi) no causality between GDPP and interest rates in both the short and the long run; vii)a

bidirectional causality between exchange rate and GFCF in the short run, showing the importance of capital goods imports on economic growth in South Africa; viii) a bidirectional causality between GFCF and interest rate in the short run; and ix) no causality between exchange rate and interest rates.

For model 2, the finding reported in Table 4, Panel 1, where imports are measured by intermediate goods (IG), confirmed a: i) unidirectional causal flow from GFCF to IG in both the short and the long run; ii) a bidirectional causality between IG and exchange rate in the short run and a unidirectional causal flow from exchange rate to IG in the long run; iii) no causality between IG and interest rate, regardless of the time considered; iv) a bidirectional causality between GDPP and GFCF in the short run and a unidirectional causal flow from GFCF to GDPP in the long run; v) a unidirectional causal flow from exchange rate to GDPP in the short run and in the long run, confirming the reliance of South Africa on international trade; vi) no causality was confirmed between GDPP and interest rate in the short run and the long run; vii) bidirectional causality between GFCF and interest rate in the short run; and viii) bidirectional causality between GFCF and interest rate, implying a reliance of domestic investors on borrowing money from the banks to support their businesses; and ix) a unidirectional causal flow from interest rate to exchange rate.

The results reported in Table 4, Panels 2, where imported capital goods and total imports are used as imports measures, respectively, confirm a bidirectional causality between capital goods and GDPP in the long run and in the short run, and a bidirectional causality between GDPP and total imports irrespective of the time considered. The findings from this study are consistent with the theory were imports of capital goods lead to higher economic growth as the capital goods increase the production capacity. The findings from this study are consistent with results from Ahmed, Cheng and Messinis (2011) in sub-Saharan African countries; Zang and Baimbridge (2011) in a study on South Korea and Japan; Cetintas and Barisik (2009) in 13 transition economies.

Other results reported for model 3 confirmed i) unidirectional causal flow from GFCF to capital goods imports (KG) in both the short and long run; ii) a bidirectional causality between KG and exchange rate in the short run, and iii) a unidirectional causal flow from exchange rate to KG in the long run, confirming the reliance of South African investors on buying capital goods from other countries; iv) no causality between KG and interest rate; iv) unidirectional causal flow from exchange rate to GDPP in the short run and the long run; v) bidirectional causality between GDPP and GFCF in the short run and a unidirectional causal flow from GFCF to GDPP in the long run, confirming the positive long term impact the investment in capital goods has on economic growth; vi) no causality was confirmed between GDPP and interest rate in the short run and the long run; vii) a bidirectional causality between GFCF and exchange rate in the short run; viii) a unidirectional causal flow from GFCF to interest rate in the short run; and ix) no causality between exchange rate and interest rate in the short run and in the long run.

Other results reported for model 4, where total imports are used as a measure of imports, confirmed a: i) unidirectional causal flow from GFCF to TI in the short run and the long run; ii) bidirectional causality between TI and exchange rate in the short run and a unidirectional causal flow from exchange rate to TI in the long run; iii) no causality between TI and interest rate; iv) a bidirectional causality between GDPP and GFCF in the short run and a unidirectional causal flow from GFCF to GDPP in the long run; v) unidirectional causal flow from exchange rate to GDPP in the short and long run; vi)no causality between interest rate and GDPP in both the short run and the long run; vii) a bidirectional causality between GFCF and exchange rate in the short

run; viii) a bidirectional causality between GFCF and interest rate in the short run, and ix) no causality between exchange rate and interest rate in the short run.

The findings from this study confirmed a bidirectional causality between imports and GDPP across all measures of imports at an aggregate level and at a disaggregate level and irrespective of the timeframe considered- short run or long run. Thus, a mutually reinforcing effect between imports and GDPP was confirmed across all measures on imports. This indicates the importance of the policymakers in South Africa to support imports, especially intermediate goods and capital goods because they help to boost production in the economy. Further, apart from the negative impact that consumer goods have on the balance of payments according to economic theory, this study found a mutually beneficial relationship with economic growth.

Conclusion

This study investigated the causal relationship between imports and economic growth in South Africa using data from 1988 to 2021. The study used disaggregated import data – consumer goods, intermediate goods, capital goods, and total imports as an aggregate measure for imports. Economic growth was measured by Gross Domestic product per capita. The study was motivated by the need to establish the causal relationship between economic growth and imports, especially using disaggregate data that has received little attention in the extant literature. Further, most studies focused on export, neglecting the role of imports on economic growth. Using the ARDL approach to cointegration and the ECM-Granger causality test, the study found a bidirectional causality between imports and economic growth irrespective of the import measure used and time considered – short run or long run. Thus, imports play an important role in stimulating economic growth in South Africa, and in return, economic growth results in an increase in imports. It can be concluded that South Africa benefits immensely from imports despite the belief that imports drain resources from the country in comparison to exports. Therefore, it can be concluded that South Africa does not follow a distinct import or export-growth hypothesis but rather a mutual relationship – the export-import growth hypothesis. Based on this finding, it is recommended that the South African government implements policies that support imports of categories, such as import of consumer goods, apart from import of capital goods and intermediate goods that promote the national development agenda.

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