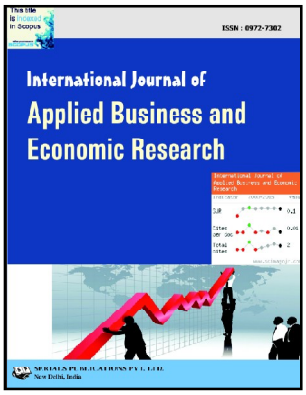

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Trade Effects of the Southern African Customs Union (SACU) on Botswana's Imports: A Gravity Model Analysis

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Abstract: This paper uses the augmented gravity model to investigate the potential trade effects of SACU on five of Botswana's selected imports (cereals, beverages, salt, soap and vehicles). Using annual data for the period 2007 to 2013, and Random Effects (RE) estimation method, the paper finds SACU to have significant trade creation and expansion effects on cereals and salt. Results further reveal trade contraction on soap and beverages, and trade diversion on vehicles. The paper explains import substitution of soap and beverages as one of the strategies that that have contributed to trade contraction. It further highlights measures such as the removal of internal tariffs within SACU and the adoption of the Common External Tariff (CET) structure that have caused trade diversion on vehicle imports. It is recommended that the government should focus more on the Import Substitution (IS) strategy as it seems to be working.

Keywords: SACU, Gravity model, trade creation, trade diversion, trade expansion, trade contraction, Import Substitution.

1. INTRODUCTION

According to a report by World Bank (2005), the number of Preferential Trade Agreements (PTAs) has increased four-fold since 1990's. The failure of multilateral trade liberalization has paved way for regional integration. Regional integration is dubbed discriminatory nature, hence could cause both positive and negative effects to the welfare of the member countries. As noted by Viner (1950), the theory of economic integration depends upon the theory of customs union (CU) since the impacts of a CU on the members can be easily assessed and modelled.

A CU can induce trade creation, when a member country substitutes its domestic production with cheaper imports from member countries. This creates a positive welfare effect because CU members alter their production structures to fit better with their respective comparative advantages. In contrast, the margins of preference that CU members enjoy could induce trade diversion, when a CU member substitutes

its imports from non-member countries with imports from within the CU. Trade diversion creates a negative welfare effect because imports are not sourced from the most efficient supplier-country. Some examples of CUs include the Eurasian Customs Union (EACU), European Union Customs Union (EUCU), Southern African Customs Union (SACU); the East African Community Customs Union (EAC CU) and the EU–Andorra Customs Union.

SACU dates back to 1910 when the agreement was signed by South Africa, Swaziland, Basutoland and Bechuanaland. This agreement lasted until mid-1960s when the British Protectorates got independence. In 1969, it was renegotiated between the apartheid government and, Botswana, Lesotho and Swaziland. After gaining independence in 1990, Namibia joined SACU (Kirk and Stern, 2003). In 2002, in light of South Africa having become democratized, a new agreement was signed where SACU was reconstituted and democratized and a revenue sharing formula set. This is the agreement that is operational to date. South Africa is the dominant economy in SACU. Consequently, due to the duty-free trade within SACU, the BLNS (Botswana, Lesotho, Namibia and Swaziland) are heavily dependent on South Africa for imports, especially consumer goods. It is, therefore, important to empirically examine the trade effects of SACU membership on the BNLS imports (Kirk and Stern, 2003). Specifically, this paper uses an augmented version of the gravity model and a panel data estimation method (RE) as specified in Martinez-Zarzoso and Nowak-Lehmann (2003); to assess the potential effects of SACU on Botswana's imports. Notably, the majority of the empirical studies on the effects of CUs on member states' trade flows are conducted using aggregate data, so as to avoid aggregation bias in estimating gravity models; as Anderson and Wincoop (2003) noted.[1]

The main objective of this paper is to investigate the trade effects of SACU on Botswana's imports. Specifically, the paper seeks to establish whether SACU has created, expanded, diverted or contracted trade on 5 of Botswana's imported commodities: Cereals, Beverages, Salt, Soap and Motor Vehicles. The selection of these products is based on three factors. Firstly, those produced in Botswana and also within SACU in order to capture trade creation; secondly, those produced both within and outside SACU in order to capture trade diversion; and thirdly, those whose CET is significantly lower than the pre-SACU MFN tariffs (refer to Figure 1). The study covers nine years (2007-2014) and twenty countries representing the other four SACU members[2] and Botswana's major trading partners (SACU non-members).[3] The rationale for study the period 2007-2014 is data availability, which was limited because of the disaggregation of the improts.

The rest of the paper is organised as follows: Section Two describes the 2002 SACU Agreement, Botswana's import structure and import substitution. A review of the existing literature is discussed in Section Three while in Section Four; the methodology based on the gravity model of bilateral trade framework is outlined. Thereafter, results of the empirical estimation of the gravity equation are presented in Section Five. Section Six concludes the paper.

2. THE 2002 SACU AGREEMENT

The 2002 SACU Agreement was signed as a response to regional economic and political changes during the nineties such as the abolishment of the apartheid policy; Namibia gained independence and joined SACU, conclusion of the Uruguay Round of multilateral talks, and the formation of the World Trade Organization (WTO) (Kirk and Stern, 2003). The agreement brought certain changes such as provision for

SACU as an international organisation with specific institutions, legal personality, common policies and regulations on decision making. However, SACU's essential feature of the common revenue pool and revenue transfer to the BNLS states was retained. SACU's vision is "to become an economic community with equitable and sustainable development, dedicated to the welfare of its people for a common future" (Kirk and Stern, 2003).

Notably, the 2002 Agreement has various inconsistencies such as: (1) the individual member states are still allowed to impose export and import restrictions and prohibitions; (2) lack of a common negotiating mechanism, and (3) lack of a joint policymaking since decisions are based on consensus (Kirk and Stern, 2003).

The SACU Tariff Structure

The tariff structure that SACU inherited from the apartheid era had numerous peculiar characteristics: it was extremely protectionist, opaque and complex, tariffs were unilaterally set by South Africa, and the tariff revenue sharing favoured the BNLS. SACU has undergone considerable trade liberalization and there has been progress in reducing some of these problems (World Trade Organization, 2015). As a customs union, the SACU member states have a CET, implying that no import duties, customs or taxes are levied intra-regionally, while imports from non-SACU members are dutiable based on four rates of duty columns of the CET. These four duty columns include imports from members of the European Union (EU), South African Development Community (SADC); the European Free Trade Association (EFTA) and from the other countries (General column) (World Trade Organization, 2015).

The SACU CET is managed by the International Trade Administration Commission of South Africa. The 2015 MFN applied tariffs are based on the 2012 Harmonized System. The SACU CET contains 7426 lines (at HS 8-digit level). There are specific duties to products such as coal, agricultural products and some textiles. Table 1 below shows the structure of SACU applied MFN tariffs in 2015 (World Trade Organization, 2015).

Table 1
Structure of SACU applied MFN tariffs 2015

Tariff	*2015*
Simple average tariff rate	8.3
Agricultural products (WTO definition)	9.9
Non Agricultural products (WTO definition)	8.0
Agriculture, hunting, forestry and fishing	3.5
Mining and quarrying	0.1
Manufacturing	8.7
Non-*ad valorem* tariffs	3.8

Source: WTO, 2015 Secretariat calculations based on tariff information from the South African Revenue Service (SARS).

Focusing on the selected imports for this study, Figure 1 shows the *change* in tariff rates between 1998 and 2013. Salt imports register the largest decline (-35.2) followed by vehicles (-8.6). In absolute terms, Beverages have the highest CET (18.3%) while cereals have the lowest (1.1%).

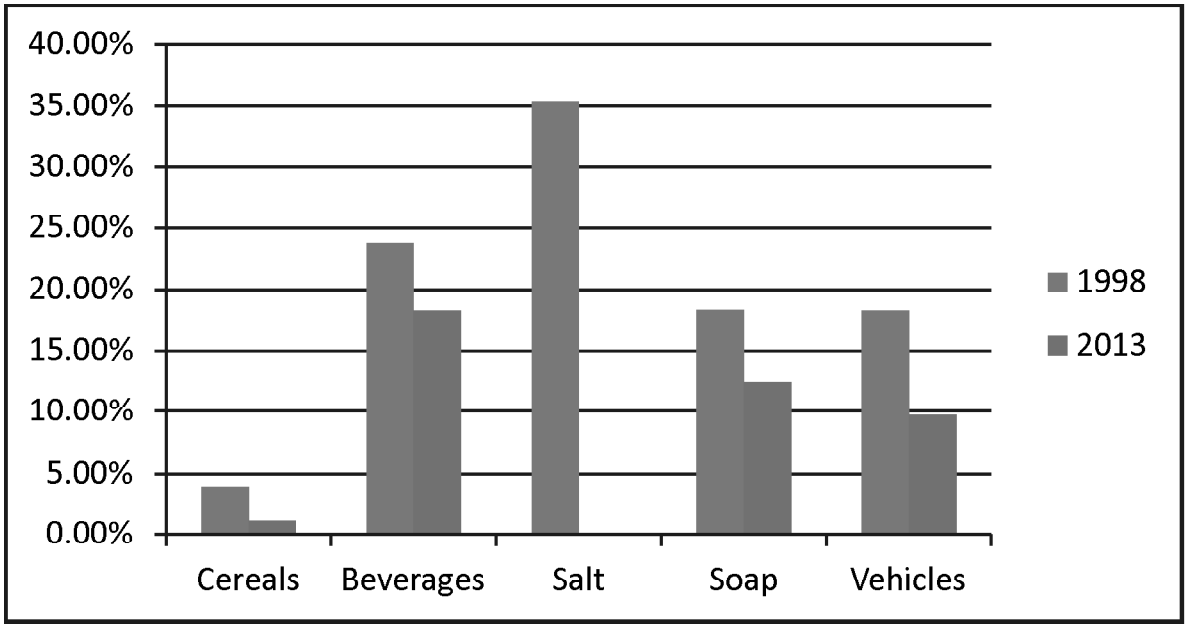

Figure 1: Tariffs Change in the Selected Imports

Source: WTO database, (2016).

2.1. Botswana's Import Structure

Figure 2 below shows percentage distribution of the principal imports in Botswana as at July 2015. From the chart, diamonds was the largest contributor to total imports (21%), followed by machinery and electrical equipment (18%) and in third place was fuel (15%). The least contributor was salt ores and related products (1.1%) (Statistics Botswana, 2015).

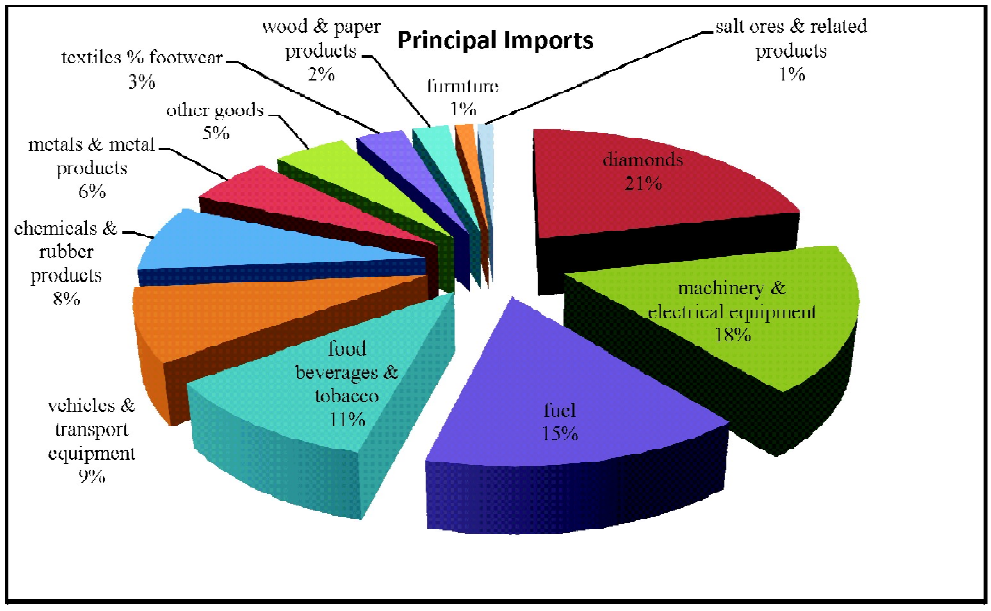

Figure 2: Botswana's Principal Imports Composition (2015)

Source: Statistics Botswana (2015).

Data on Botswana's imports by source as at July 2015 showed that South Africa was the highest source with about 65 percent, followed by Canada, Asia and the EU (13, 9.1 and 7.9 percent respectively). Imports from the other SACU members were about 1.1, 0.07 and 0.0 percent for Namibia, Swaziland and Lesotho respectively (Statistics Botswana, 2015).

2.2. Import Substitution

Import substitution (IS) refers to the replacement of imports with domestic production. This tends to be achieved through various protectionist measures such as extremely high tariffs, import licensing, quotas, exchange controls; special preferential licensing to capital goods and credit policies used by the government to restrict imports (Ogujiuba, Nwogwugwu and Dike, 2011). Various countries across the globe have implemented the IS policy to protect domestic infant industries with the aim of achieving self-sufficiency in the production of basic manufacturing goods. Table 2 below shows a number of IS measures adopted by different countries.

Table 2
IS measures adopted by some countries

Country	*Commodity*	*IS Measures*
Argentina	Oil, steel, chemicals, motor vehicles	Credit incentives such as increasing the reserve requirement to allow banks to finance IS industries at low interest rates
Columbia	Non-traditional agricultural products	Multiple exchange rates (producers of non-traditional agricultural products allowed to sell their forex at the floating free rate)
Pakistan	Consumer items	High tariffs on imports of consumer goods, low tariffs on raw materials and capital goods
Korea and Taiwan	Finished consumer goods	Multiple tariff rates (high tariffs on finished consumer goods with close domestically produced substitutes, low tariffs on products with no close substitutes)
Nigeria	Rice, wheat	High tariffs on rice and wheat imports.
Kenya	Textiles and clothing, beverages, cement, matches, batteries, fish and fish products, dairy, sugar, tobacco	High tariffs on, for example; Cotton bed and linen – 50% Cement – 55% Matches – 35% Batteries – 35% Fish and fish products – 25%

Source: (Bruton, 1998; Africa Progress Report, 2014; Mendes, Bertella and Teixeira, 2014).

2.2.1. Import Substitution in Botswana

Botswana's tariff policy is determined by SACU's CET policy, whereby goods from SACU members are duty-free and non-members are accorded MFN duties. The country's average simple applied MFN tariff for industrial goods is 7.8%. However, apart from this selective tariff protection for MFN imports, the SACU agreement allows Botswana to increase tariff rates on some products from SACU members up to eight years for the purpose of protecting infant industries. In addition, trade restrictions such as seasonal

trade bans and import controls to minimize cross-border competition are imposed on some products (Seleka, 2005).

In 1984, Botswana developed the first Industrial Development Policy (IDP) that focused on IS. One of the policies adopted during this period was the Financial Assistance Policy (FAP) that provided capital grants and subsidies to infant industries in manufacturing, non-traditional agriculture and tourism. Such products include beverages such as beer; soap and milled products, poultry meat, beef, fresh milk, eggs and key vegetables. Although there was a considerable shift from IS to export-led growth strategy in 1998, IS still remains a key subject in the Economic Diversification Drive (EDD) strategy launched in 2011 (Botswana Government, 2014). As a result of IS, domestic production of the protected products has increased significantly. Table 2a below shows some domestic industries that have developed as a result.

Table 2a
Examples of Domestic Industries in Botswana Producing Import Substitutes

Company	*Products*
Kgalagadi Soap Industries (Pty) Ltd.	Cooking oil and bathing soap
Kgalagadi Breweries Ltd.	Beer, bottled water, soft drinks
Sechaba Breweries Holdings	Beverages (alcoholic, non-alcoholic, opaque)
NCI Botswana (Pty) Ltd.	Foam bath, vinegar, cold drink, powder and tomato sauce
Chemical Industries Botswana (Pty) Ltd.	Detergents (chemicals)
Clover Chemical Industry	Detergents (chemicals)
Halmatic Investments (Pty) Ltd.	Detergents (chemicals)

Source: (BEDIA, 2011)

3. LITERATURE REVIEW

3.1. Theoretical Literature

Viner, (1950) defines a CU as a trade agreement comprised of two or more countries that trade duty-free among themselves, while maintaining a CET against the non-members. In his analysis, Viner brings out a distinction between two effects of a CU; trade creation and trade diversion. Trade creation results from the elimination of tariffs whereby, more expensive domestic production is replaced by cheaper production in partner countries. Consequently, there is an improvement in welfare due to the resultant increase in consumer's surplus. Conversely, trade diversion will occur if imports from the partner countries replace less expensive imports from non-members. Therefore, according to Viner (1950), a CU improves welfare if trade creation outweighs trade diversion. Figure 3 below is a representation of Viner's static analysis of the trade effects of CUs.

Before the formation of a CU between the home country (H) and partner country (P), a non-discriminatory tariff T on a given import, say M exists. The price of the good is therefore the world price (Pw) plus tariff (T), and total imports are the difference between Demand and Supply at that price (d_T - S_T). After the two countries form a CU, this tariff is eliminated between the two countries and a CET is imposed on non-members. Consequently, good M becomes relatively cheaper in country P (partner) than country W (non-CU member), at price P_p which is less than Pw+T. Country H now imports good M from P (d_{CU} - S_{CU}), thus, creating trade. Regions ***(b + d)*** represent ***trade creation.***

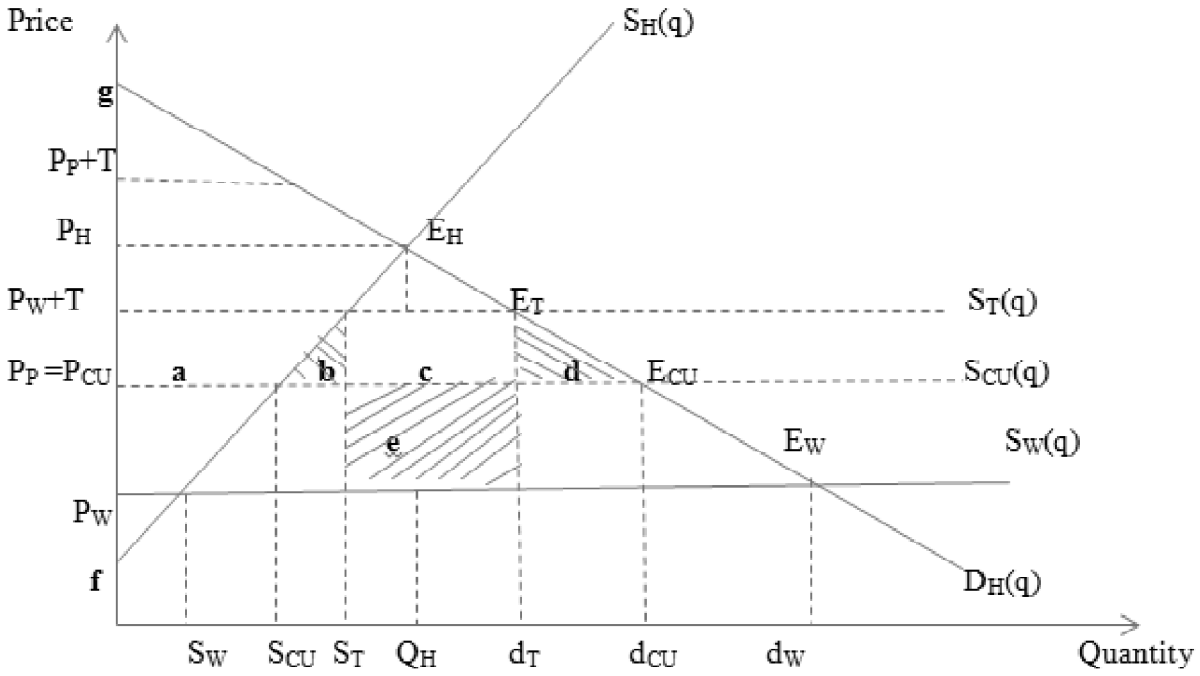

Figure 3: Viner's Static Analysis of Trade Effects of CUs

When the tariff T was non-discriminatory, the price of M was lower at country W (the rest of the world) compared to country P ($P_W+T < P_P+T$), hence country H was importing from W. However, after the CU, good M is cheaper at P than W ($P_{CU} = P_P < P_W+T$). As a result, H shifts importing from W to P. This is ***trade diversion*** because trade has been *diverted* from a least cost producer (W) to a high cost producer (P) (Viner, 1950).

3.2. Empirical Literature

Kwentua (2006) examined trade creation and diversion effects of the EU-SA agreement. Using the standard gravity model of bilateral trade flows, he found evidence of an increase in trade between members of the EU-SA agreement, and also between members and non-members of the EU-SA agreement. In conclusion, Kwentua (2006) noted that the EU-SA agreement has created trade. He also pointed out that this trade creation could be due to income effect.

Similarly, Negasi (2009) investigate trade creation and diversion effects of SADC in four sectors (agricultural, fuel and minerals, and light and heavy manufacturing). To capture the effects of SADC, Negasi (2009) introduced two dummies (Intra-SADC and Extra-SADC). Findings revealed trade creation in fuel and minerals, and heavy manufacturing sectors; implying that SADC has displaced trade with the rest of the world in these sectors. However, results showed trade diversion in both agricultural and light manufacturing sectors.

Jordaan and Kanda (2011) also used the gravity model augmented with intra-bloc and extra-bloc dummies to capture trade creation and trade diversion effects of SADC and EU-SA preferential trade agreements. Using a panel of 39 countries for the period 1994-2008, the study found South Africa's GDP and that of the trade partners to positively influence trade as per *a priori* expectations. Moreover, the EU-SA dummy coefficients were both positive and significant, suggesting trade creation and trade expansion

effects. On the contrary, the SADC dummy coefficients were both negative implying trade contraction effects.

4. THEORETICAL FOUNDATION OF THE GRAVITY MODEL

The concept of gravity model was introduced in early sixties by Tinbergen and Pöyhönen. This model explains trade flows between two countries (home country and trade partner) as determined by their GDPs and the distance between them (Tinbergen, 1962; Pöyhönen, 1963).

$$Trade_{ijt} = \lambda_0 \cdot GDP_{it}^{\alpha 1} \cdot GDP_{t}^{\alpha 2} \cdot D_{ij}^{\alpha 3} \cdot \varepsilon_{ijt} \tag{3.1}$$

Where $Trade_{ij}$ is unidirectional exports or imports between the two countries (*i* and *j*), GDP_i and GDP_j are the national outputs of countries *i* and *j* respectively and D_{ij} denotes distance between the trading partners

In subsequent studies, the formulation of gravity model has been improved to include other variables that are said to influence trade flows such as populations of the home and partner countries, exchange rate, cultural, geographical and historical dummy variables such as common language, colony and contiguity, and a set of dummies to capture the impact of RTAs (Anderson, 1979; Berstrand, 1985; Helpman, 1987; Egger, 2000; Soloaga and Winters, 2001; and Limao and Venables, 2001; Martinez-Zarzoso and Nowak-Lehmann, 2003; Endoh, 2005; Carrère, 2006; Magee, 2008).

$$\begin{aligned} lTrade_{ijt} = {} & \alpha_{ij} + \beta_0 + \beta_1 lGDP_{it} + \beta_2 lGDP_{jt} + \beta_3 lPOP_{it} + \beta_4 lPOP_{jt} + \beta_5 lD_{ij} \\ & + \beta_6 lRER_{ijt} + \beta_7 RTA_{ij} + \beta_8 RTA_i + \varepsilon_{ijt} \end{aligned} \tag{3.2}$$

Where; Where POP_{it} and POP_{jt} are populations of home country, i and partner, *j* at time t respectively, and RER_{ijt} is the bilateral real exchange rate between countries *i* and *j* at time *t*. RTA_{ij} captures trade between RTA members. It is the trade creation dummy. RTA_i captures trade between a RTA member and a non-RTA member. It is the trade diversion dummy. α_{ij} denotes country-pair fixed effects that account for cultural, geographical and historical factors such as common language, colony and contiguity, remoteness, landlockedness and other bilateral influences which may deviate a country's normal propensity to trade (Egger and Pfaffermayr, 2000; Magee, 2008).

4.1. Specification of the Empirical Model

The specification of the empirical model used in this study is adopted from various studies including a report by IMF (2004) that analysed how the Barcelona process impacted Morocco's trade. Secondly, is a study by Zidi and Dhlifani (2013) that analysed trade creation and trade diversion effects of the Tunisia-EU Agreement. Lastly, the specification by Jordaan and Kanda (2009) is also adopted. The following equation is estimated:

$$\begin{aligned} lM_{ijt} = {} & \beta_{ij} + \lambda_0 + \lambda_1 lGDP_{it} + \lambda_2 lGDP_{jt} + \lambda_3 lPOP_{it} + \lambda_4 lPOP_{jt} + \lambda_5 lD_{ij} \\ & + \lambda_6 lRER_{ijt} + \lambda_7 SACU_{ij} + \lambda_8 SACU_i + \varepsilon_{ijt} \end{aligned} \tag{3.3}$$

Definition of Variables

M_{ijt} - Denotes Botswana's imports from partner country j at time t, and are disaggregated into five products: cereals ($CERM_{ijt}$), beverages ($BEVM_{ijt}$), salt ($SALTM_{ijt}$), soap ($SOAPM_{ijt}$) and vehicles ($VEHM_{ijt}$);

GDP_{it} and GDP_{jt} - Denote the real GDP of the home country i (Botswana) and the trade partner j at time t respectively. They are measured at market prices (constant 2005 US$);

POP_{it} and POP_{jt} - Denote the populations of Botswana and the trading partner j at time t respectively. They are measured in million people;

RER_{ijt} - Denotes the bilateral real exchange rate between Botswana and the trading partner j at time t. It is computed as shown in equation 3.4;

$$RER_{ijt} = \frac{Nominal\ Exchange\ Rate\ in\ Botswana\ (pula/US\$)}{Nominal\ Exchange\ Rate\ in\ trade\ partner\ j\ (j's\ currency/US\$)} * \frac{CPI_j}{CPI_i} \quad (3.4)$$

D_{ij} - is the distance between Gaborone and the capital city of the trading partner (in kilometres).

The construction of the SACU dummies is based on the date when the new SACU was formed among South Africa, Lesotho and Swaziland, that is, 1969. For Namibia, it is based on its date of entry, that is, 1991 (Tables 3 and 4).

$SACU_{ij}$ – This dummy variable takes the value of one if Botswana's trade partner, j is a member of SACU and zero otherwise. It captures the effect of SACU on Botswana's intra-SACU imports.

$SACU_i$ - This dummy variable takes the value of one if Botswana's trade partner, j is not a member of SACU and zero otherwise. It captures the effect of SACU on Botswana's imports from countries outside SACU.

Table 3
Interpretation of the signs of the coefficients of the SACU dummy variables

Sign		*Conclusion*
$SACU_{ij}$ +	$SACU_i$ +	Trade Creation and Trade Expansion
$SACU_{ij}$ +	$SACU_i$ -	Trade Diversion
$SACU_{ij}$ -	$SACU_i$ +	Trade Expansion
$SACU_{ij}$ -	$SACU_i$ -	Trade Contraction

Source: Cernat (2003)

4.2. The Anticipated Signs

Table 4
The Anticipated Signs for the Explanatory Variable

Explanatory Variable	*Sign*	*Remarks*
GDP_{it}	+	A higher GDP for the importer country reflects a higher absorption capacity (demand side)
GDP_{jt}	+	A higher GDP for the exporter country reflects a higher production capacity (supply side)
POP_{it} and $POPj_t$	+ or -	A higher population of the importer or exporter country could reflect a higher absorption effect or economies of scale effect
RER_{ijt}	-	An increase in the RER (real depreciation of the Pula) makes imports more expensive relative to domestic goods

contd. table 4

Explanatory Variable	*Sign*	*Remarks*
D_{ij}	-	Distance acts as a proxy for transportation costs that inhibit trade
$SACU_{ij}$	+	A CU is expected to intensify trade among its members, that is, trade creation.
$SACU_{i}$	- or +	A CU can shift trade from more efficient non-members to less efficient members (trade diversion), or can create more openness to imports from non-members (trade expansion effect)

Source: (Jordaan and Kanda, 2011; Zidi and Dhifallah, 2013).

4.3. Data

The dataset for this study comprises a panel of nine annual observations (2007-2014) and twenty countries representing the other SACU members and Botswana's major trading partners (SACU non-members). The choice of the study period is based on data availability. Trade data is obtained from the COMTRADE statistics database while data on the macroeconomic variables is obtained from the World Bank Indicators. Lastly, the distance between capital cities is obtained from the MAPCROW website.

5. RESULTS

5.1. Tests on the Data

5.1.1. Panel Unit Root Testing

The Fisher-type stationarity tests (Augmented Dickey Fuller and Philips Perron) are used in this study. These tests are suitable for an unbalanced panel. The null hypothesis is that all panels contain unit roots against alternative that at least one panel is stationary. Table 5 below shows results of the Fisher-type tests (ADF and PP).

Table 5
Fisher-Type (ADF & PP) Unit-root Test Results

Variables	*Levels*		*First Difference*		
	Constant, no trend	*Constant, with trend*	*Constant, no trend*	*Constant, with trend*	*Conclusion*
lCERM		10.003 *			I(0)
lBEVM	0.957		12.949*		I(1)
lSALTM	3.182 *				I(0)
lSOAPM	2.616**				I(0)
lVEHM	1.680**				I(0)
$lGDP_{i}$		-2.316		19.135*	I(1)
$lGDP_{j}$	-1.604	-	7.761*	-	I(1)
$lPOP_{i}$	-	9.576*	-	-	I(0)
$lPOP_{j}$	12.356*	-	-	-	I(0)
lD	12.178*	-	-	-	I(0)
lRER	12.399*	-	-	-	I(0)

The asterisks, * and ** denote 1% and 5% significance levels respectively. The values in the tables are the modified inverse chi-square values. I(0) and I(1) denote integration of orders zero and one respectively.

5.1.2. Hausman Test

The Hausman test is used to decide which method of estimation between the fixed effects (FE) or the random effects (RE) is appropriate. The hypotheses are as follows:

H_0: Individual effects are not correlated with the regressors (RE model is appropriate)

H_1: Individual effects are correlated with the regressors (FE model is appropriate)

Table 6
Hausman Test Output

	Chi^2	$Prob>Chi^2$
CERM	7.93	0.1599
BEVM	7.30	0.1994
SALTM	0.94	0.1155
SOAPM	4.06	0.2554
VEHM	0.70	0.8733

From table 6 above, the Hausman statistics (Chi^2) for all the models are not statistically significant hence; the models are specified by a panel with individual random effects. In this case, the method of Generalized Least Squares (GLS) is used to estimate the models.

5.1.3. Heteroskedasticity Test

The Breusch-Pagan test is used. The hypothesis is specified as follows:

H_0: Constant variance

H_1: Heteroskedasticity exists

Table 7
Breusch-Pagan / Cook-Weisberg Test for Heteroskedasticity

	chi^2	$Prob > chi^2$
CERM	0.56	0.4527
BEVM	3.71	0.0542
SALTM	0.02	0.8861
SOAPM	0.05	0.8283
VEHM	0.06	0.8030

From Table 7 above, it can be concluded that the variances in all the models except beverages are homogeneous as the probabilities of chi-square are greater than 10% level of significance. Hence, heteroskedasticity exists only in the beverages model.

5.1.4. Serial Correlation Test

The study employs Wooldridge's test for serial correlation. The hypothesis is as follows:

H_0: No first-order serial correlation

H_1: First-order serial correlation exists

Table 8
Wooldridge Test for Serial Correlation

	F	*Prob > F*
CERM	20.401	0.0007
BEVM	0.083	0.7781
SALTM	4.414	0.0595
SOAPM	14.133	0.0021
VEHM	0.06	0.8030

From table 8 above, the F-statistic is statistically significant for cereals, salt and soap models; implying that the residues of each model are correlated over time. However, there is no serial correlation for beverages and vehicles models.

Remedy

The remedy for the problems of heteroskedasticity and auto correlation in the data is clustering the panel variable using the "***re, cluster (panel variable)"*** Stata command. For the beverages model, the "xtregar" Stata command that corrects for first-order auto correlation by subjecting the data to a Cochrane-Orcutt iterative procedure is used (Gujarati, 2009).

5.2. Interpretation of Results

The gravity model equation (3.3) has been estimated using the RE estimation technique. Five equations have been estimated;

$$lM_{ijt} = \beta_{ij} + \lambda_0 + \lambda_1 lGDP_{it} + \lambda_2 lGDP_{jt} + \lambda_3 lPOP_{it} + \lambda_4 lPOP_{jt} + \lambda_5 lD_{ij} + \lambda_6 lRER_{ijt} + \lambda_7 SACU_{ij} + \lambda_8 SACU_i + \varepsilon_{ijt}$$

Where M_{ijt} is cereals imports for model one, beverages imports for model two, and salt, soap and vehicles imports for models three, four and five respectively. Table 9 below shows a summary of the regression results.

The overall R-Squared for all the models except for model five is above 50 percent suggesting that more than a half of the variations in imports (cereals, beverages, salt and soap) are explained by the variables used in the model. For model 5, the R-Squared suggest that about 49 percent of the variations in vehicle imports are explained by the variables used in the model. The Wald chi^2 test shows that all the models are good predictors (goodness of fit) since the probability is less than one percent.

Table 9
Regression Results of the three sectors (2005-2013)

Variables	*Model 1 [lCERM]*	*Model 2 [lBEVM]*	*Model 3 [lSALTM]*	*Model 4 [lSOAPM]*	*Model 5 [lVEHM]*
$lGDP_i$	-1.9999 (-0.40)	8.5342 (1.06)	5.268 (1.03)	9.003** (1.98)	0.547 (0.31)
$lGDP_j$	0.497** (2.37)	0.6774* (7.45)	5.230 (0.58)	0.589* (3.83)	0.348** (2.86)
$lPOP_i$	24.932** (2.55)	-12.992 (-0.48)	-22.928** (-2.57)	11.175 (1.59)	0.694 (0.19)
$lPOP_j$	1.164** (2.02)	0.825** (2.51)	2.075* (3.52)	0.746** (2.00)	0.535*** (1.89)
lD	-2.839** (-2.88)	-0.645*** (-1.79)	-3.525** (-3.00)	-1.422*** (-1.84)	-0.480 (-1.24)
lRER	-0.455 (-0.74)	1.509* (5.75)	0.435 (0.59)	0.627** (2.33)	-0.0162** (-2.21)
$SACU_{ij}$	1.944 (0.54)	-6.234* (-4.03)	-11.296** (-2.84)	-2.066 (-0.77)	7.146 * (7.74)
$SACU_i$	2.791 (0.354)	-4.983** (-2.29)	4.680 (1.27)	-1.369 (-0.46)	- 3.787** (-3.22)
Constant	-367.84	-13.837	340.341	-167.805	-47.9182
No. of Obs.	180	180	180	180	180
Overall R^2	0.533	0.597	0.514	0.573	0.489
Wald $chi^2_{(9)}$	36.49	1566.29	26.28	49.81	87.28
Prob > chi^2	0.0000	0.0000	0.0018	0.0000	0.0000

(The asterisks *, ** and *** denote that the coefficient is statistically significant at 1%, 5% and 10 % levels respectively. The values in parentheses are Z values. All the variables except the dummies are in logs).

From the results above, both the GDP measures (for Botswana and the trade partners) have positive correlation with the magnitude of the five selected imports except for cereals, which is negative but insignificant. Botswana's GDP has a significant positive effect on soap imports (for every one percent increase, soap imports increase by about nine percent). A higher GDP for the importer country reflects a higher absorption capacity (demand side). A one percent increase in the GDP of the exporter country increases imports of all the five selected commodities by less than one percent. A higher GDP for the exporter country reflects a higher production capacity (supply side).

Botswana's population has a significant negative effect on salt imports. Precisely, a one percent increase in Botswana's population reduces salt imports by about 23 percent. A higher population of the importer country could imply economies of scale effect. Conversely, a higher population of the importer country could imply a higher absorption capacity hence, a positive relationship with imports; like the case for cereals in this study. The elasticity of cereals imports with respect to Botswana's population suggest that a one percent increase in Botswana's population increases imports of cereals by about 25 percent. Similarly, the results reveal a positive and significant relationship between population of the exporter country and

the imports of all the five selected imports. A higher population of the exporter country translates to higher exports to trade partners if economies of scale effects occur.

From the results, distance is conveyed to be playing its conventional role in a gravity model framework (proxy for international trade costs). Distance has a negative effect on imports of cereals, beverages, salt and soap into Botswana.

The results also reveal a negative and moderately significant relationship the bilateral real exchange rate and imports of vehicles into Botswana. By implication, a depreciation of the bilateral real exchange rate between Pula and the trade partner currency reduces vehicles imports into Botswana by about 0.02 percent. Real depreciation of the exchange rate adversely affects imports as it makes them more expensive relative to domestic goods. Interestingly, the coefficient for RER_{ij} is positive and significant for beverages and soap imports, implying that a depreciation of the bilateral real exchange rate between Pula and the trade partner currency boosts imports of these products. This is contrary to theory. Furthermore, cereals and salt imports are price inelastic as the elasticities are statistically insignificant.

The SACU Dummy Variables

Table 10 below shows the signs of dummy variables representing the intra and extra SACU trade, as earlier defined. These are the variables of interest in this study, and the results reveal that the trade effects vary across the imports.

Table 10
Signs of the Dummy Variable Coefficients

Import	$SACU_{ij}$	$SACU_{i}$	*Trade Effect*
CERM	+	+	Trade Creation and Expansion
BEVM	-	-	Trade Contraction
SALTM	-	+	Trade Expansion
SOAPM	-	-	Trade Contraction
VEHM	+	-	Trade Diversion

For cereals imports, the coefficients of the variables $SACU_{ij}$ and $SACU_{i}$ are positive though insignificant. The positive signs portray possible increase in both intra and extra SACU trade over time; that is, SACU has ***caused trade creation and trade expansion***. The trade creation can be attributed to the elimination of tariffs among the SACU members; while the trade expansion may be due to the low CET on cereals (1.1%) as compared to the pre-SACU most favoured nation (MFN) tariff rate (3.9%) (Refer to figure 1). Also, the poor climatic conditions in the country have made the production of cereals costly considering that the government is forced to set up irrigation schemes and other measures necessary for the sector.

For beverages imports, the coefficients of the variables $SACU_{ij}$ and $SACU_{i}$ are negative and highly significant. This shows that both intra and extra SACU trade has significantly declined over time; implying ***trade contraction effect***. This may be due to two factors: the CET that still remain high (18.3%), and the IS strategy that has resulted in growth of local producers of beverages such as Kgalagadi Breweries Limited and Sechaba Breweries Holdings among others (refer to Table 2).

Similarly, for soap imports, the coefficients of the variables $SACU_{ij}$ and $SACU_i$ are negative though insignificant. This can be taken to portray possible signs of weak ***trade contraction*** among the soap imports; attributable to the IS strategy and still high CET (12.5%). Local soap-producing firms such as Kgalagadi Soap Industries (Pty) Limited, NCI Botswana (Pty) Limited and Clover Chemical Industry among others have developed, pausing stiff competition to soap imports.

The coefficient for $SACU_{ij}$ is negative and moderately significant while for $SACU_i$ is positive. Implicitly, intra-SACU imports of salt have declined as those from non-SACU remain high, that is, ***trade expansion effect***. This is contrary to the expectations since the goal of a CU is to intensify trade among the members. A possible explanation for this scenario could be the significant decline in salt tariff rates (from 35.3% pre-SACU simple average MFN rate to 0.1% post-SACU CET) that has promoted trade.

The results further reveal ***trade diversion effect*** for vehicle imports. The coefficient for $SACU_{ij}$ is positive while for $SACU_i$ is negative and significant. This shows that trade has shifted from more efficient non-members (such as Japan) to less efficient SACU members (such as South Africa) due to elimination of the initially high tariffs (45%) among the members. Moreover, the imposition of a CET has made imports from non-members relatively more expensive, hence shifting trade in favour of the members.

6. CONCLUSION AND RECOMMENDATIONS

This paper applied the augmented gravity model of bilateral trade in the framework of the SACU agreement. The majority of the existing studies estimate an average treatment effect across all imports. However, it is not necessarily true that membership in a CU generates the same effect on all imports. Therefore, this paper assessed how SACU has affected Botswana's five selected imports (cereals, beverages, salt, soap and vehicles). The results, as expected, suggest that SACU has had different effects on the aforementioned imports. The SACU agreement has been reported to be trade creating and expanding on cereals and salt imports, which can be attributed to the elimination of tariffs among the members and low CET on non-members. On the other hand, the SACU agreement has been found to be trade contracting on soap and beverage imports, which could be attributed to the import substitution strategy. Results further reveal trade diversion for vehicle imports. This is possible considering the elimination of the initially high tariffs (45%) on the imports of vehicles.

The results for other than the CU dummy factors in the gravity model of this paper paint a familiar picture of the findings in literatures on the gravity model except that they vary from commodity to commodity.

RECOMMENDATIONS

1. The trade contraction effect on soap and beverage imports is an indication that the IS strategy is working. The government should extend this strategy to more products in order to reduce the country's high dependency on SACU (particularly South Africa) for imports.
2. The evidence of trade diversion on vehicles raises a red flag that the set CET on vehicles (9.7%) could be benefiting South Africa at the expense of the BNLS. SACU should consider lowering the CET to ensure that it achieves its vision of becoming an economic community with equitable and sustainable development for all its members.

3. SACU has created trade for cereals. This is a commendable effort considering the poor climatic conditions in Botswana. The government should focus more on importing cereals instead of promoting local production, and reallocate those resources to other sectors such as manufacturing.

NOTES

1. The methodology adopted follows on that of an earlier paper by Mbithi *et al.* (2016).
2. South Africa, Namibia, Swaziland and Lesotho.
3. China, Japan, USA, United Kingdom, United Arab Emirates, India, Zimbabwe, Zambia, Germany, Pakistan, Thailand, Singapore, Italy, Denmark, Republic of Korea and Spain.

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