AN ESTIMATION OF THE IMPACT OF GEAR AND NEPAD ON SOUTH AFRICA'S DISAGGREGATED IMPORT DEMAND FUNCTION WITH NIGERIA

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This paper estimates South Africa's disaggregated import demand function with Nigeria from 1992 to 2010 utilizing the bounds testing approach to cointegration and the unrestricted error-correction model. We further estimate South Africa's short-run and long-run import elasticities. Our results indicate a long run cointegrated relationship among the variables. However, not all the long-run elasticities display theoretically expected signs; neither are they all significant. While consumption and exports affect imports positively, investment affects it negatively. Real foreign reserves and volatility yield expected signs, but contrary to theoretical expectations, relative price is positive and highly elastic. In the short run almost all the expected elasticity coefficient signs are met and they are all statistically significant. Our study further discloses that South Africa's commitment to increasing intra-African trade through its GEAR and NEPAD policies applies negatively to Nigeria, contrary to our hypothesis. We argue that appropriate public policy at the regional level is necessary to effectively increase trade with Nigeria, given South Africa's reliance on oil imports for which Nigeria is its largest supplier.

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KEYWORDS: South Africa, Nigeria, disaggregated import demand, cointegration, GEAR, NEPAD.

INTRODUCTION

South Africa, Africa's economic giant, is lauded as one of the more growth-dynamic emerging economies in the global economy. It is characterized as a middle power in international trade with a significant trade and growth impact on surrounding economies. As the economy aspires to increase its economic footprint on the African continent, it is imperative to study its import demand function with African countries. So far, however, such research is sparse at best, with estimates of only a few African countries' import demand functions. This study seeks to fill this void in the literature. Our objective is to investigate South Africa's disaggregated import demand function and its associated long run and short run dynamics with Nigeria from 1992 to 2009. Further, we evaluate the success of its Growth, Employment and Redistribution (GEAR) and the New Partnership for Africa's Development (NEPAD) policies intended to increase intra-African trade, in this case, with Nigeria To our knowledge, this study is the only one of its kind to date. This import demand function is estimated using the bounds testing approach to cointegration and the error-correction model. We proceed in the next section with a brief history of South Africa, after which we review the literature on import demand functions. Thereafter we specify our model and variables and explain the data used for estimation. We then explain and discuss the empirical results, and the final section concludes the paper with suggestions for future studies.

Brief History of South Africa

South Africa, like most other developing countries, suffers from serious economic problems associated with a dependence on imports of capital and intermediate goods, declining exports, increased imports from the west, high unemployment rates, falling foreign reserves, and balance of payments constraints (Department of Trade and Industry, 2011; Saayman, 2010; Ngandu, 2008, 2009; Truett & Truett, 2003).

These problems are primarily a result of the rigidities imposed by the apartheid state (Thompson, 2000; Truett & Truett, 2003; Liu and Saal, 2001).

The apartheid era spanned the period 1948-1994, and the mineral-rich economy thrived at first. However, by the 1970's the economy began to stagnate mostly because of inefficiencies resulting from the distorted allocation of its resources to service its social structures of accumulation (Truett & Truett, 2003; Edwards, 2001) which benefitted one race group at the expense of the other race groups. In this racialized epoch, South Africa perpetuated a conflictual political relationship with most of its African neighbors and these inevitably stymied intra-African trade relations. At the same time, to counter international sanctions against the country, the apartheid government encouraged import substitution industries (ISI), high import tariffs, and subsidies for export promoting industries (Ngandu, 2009; Kaempfer & Ross, 2004; Liu and Saal, 2001). These measures reinforced its economic stagnation (Thompson, 2000) by creating further economic rigidities. After apartheid ended the new government began to recreate an open economy (Department of Trade and Industry, 2011; World Bank, 2010; Truett & Truett, 2003; Edwards, 2001).

It executed a series of strategic trade liberalization policies, among them, promoting privatization, loosening exchange controls, reducing tariffs and export subsidies, and encouraging intra-African trade (Saayman, 2010; Kabundi, 2009; Lesufi, 2004; Streak, 2004; Tsheola, 2002). In 1996, it implemented the Growth, Employment and Redistribution policy (GEAR) aimed at increasing its trade posture in the global economy (Department of Finance - South Africa, 1996; Streak, 2004). GEAR was reinforced in 2001 by the adoption of the New Partnership for Africa's Development, NEPAD, which embodied an alliance of key African leaders on the continent endorsed by world institutions such as the World Bank, International Monetary Fund, the World Trade Organization, and world leaders (NEPAD, 2001). NEPAD represented a quest to integrate African markets into the global economy to advance the welfare and development of the whole continent, and South Africa seemed primed to take the leadership role (Mbeki, 2001).

Table 1: Major Sources of South African Imports, 2010

Region/Country	Value of Imports (Millions of Rands)	Share of Total Imports (%)
Asia	260,023	44.5
Europe	199,273	34.1
Americas	69,839	12.0
Africa	43,931	7.5
Pacific	11,124	1.9
China	84,102	14.4
Germany	66,784	11.4
United States	42,105	7.2
Japan	30,996	5.3
Saudi Arabia	23,718	4.1
Iran	23,003	3.9
United Kingdom	22,152	3.8
India	20,749	3.5
France	17,281	3.0
Nigeria	**16,083**	**2.7**

Note: This table shows the major sources of imports by continent and country, to South Africa. Data is taken from the Department of Trade and Industry, Republic of South Africa (2011).

To encourage the principle of African development through trade, South Africa had to increase its imports from African countries while strengthening its export base. The openness to imports was reflected in the gradual decline of the price ratio of exports to imports, from 1.02 in 1996 to 0.89 in 2009 (South African Reserve Bank, 2009). Its imports grew rapidly at a rate of 8.6% between 1995 and 2008. However, as can be seen in Table 1, imports from African countries barely amounted to 7.5% of imports in 2010. Only one African country, Nigeria, its largest African trading partner, ranks as a top 10 importing country. South Africa's largest import component is oil (Table 2), and Nigeria with 99.5% of its imports in the form oil, is its top oil supplier in the world. Whereas South Africa's trade balance with the African continent overall is positive, it has a negative balance with Nigeria. (Department of Trade and Industry, 2011). Given the dominance of Nigeria in South Africa's imports, it is reasonable to estimate its import demand function with Nigeria. The outcome of this estimation would inform policy makers of the most reasonable and appropriate policies to enact in its trade policy in general, and in particular, with Nigeria and its surrounding neighbors. The objective of the current study then, is to estimate South Africa's disaggregated demand function with Nigeria from 1992 to 2010.

Table 2: Major South African Imports, 2010

HS	Product	Value of Imports (Millions of Rands)	Share of Total Imports (%)
27	**Mineral Fuels,Mineral Oils….**	**114,796**	**19.6%**
84	Nuclear Reactors,Boilers,Machinery And Mechanical	86,192	14.7%
85	Electrical Machinery And Equipment & Parts	62,577	10.7%
87	Vehicles(Excluding Railway Or Rolling- Stock)	51,279	8.8%
98	Special Classification Provisions (Vehicles' Parts)	37,938	6.5%
90	Optical Photographic,Cinematographic,Measuring,	15,139	2.6%
38	Plastics And Articles Thereof	15,118	2.6%
30	Pharmaceutical Products	15,071	2.6%
29	Organic Chemicals	10,581	1.8%
38	Miscellaneous Chemical Products	8,795	1.5%
40	Rubber And Articles Thereof	8,721	1.5%

Note: This table shows the major import products to South Africa. Data is taken from the Department of Trade and Industry, Republic of South Africa (2011).

LITERATURE REVIEW

Globalization has forced analysts to comprehend the significance of imports in studying a country's macroeconomic performance for economic growth and stability. Since imports react more rapidly than exports to trade policies, estimates of import demand functions have implications for macroeconomic policy. Given this, numerous studies have estimated the import demand functions of countries on all continents. Earlier studies, focusing on developed countries, used ordinary least squares (OLS) as a method to estimate a country's import demand function (Thursby, 1988; Gafar, 1995; Giovanneti, 1989). For example, Giovanneti (1989) showed that consumption, investments, and exports significantly affected Italy's import demand. Gafar (1995), in estimating the demand for imports of Jamaica, Guyana, and Trinidad using OLS, found that income elasticity was positive and price elasticity was negative. However, researchers have questioned these results because the time series data used in such OLS estimates are stationary (Thursby, 1989). Because macroeconomic time series are typically non-stationary, OLS results are unreliable because of serious spurious regression problems (Modeste, 2011).

To overcome false results, a surge of newer studies utilizing cointegration analysis to estimate the import demand function emerged in the last two decades. Chen (2008) for example, tackled Taiwan's import demand function using the bounds test of Pesaran et al. (2001). Results confirmed the existence of a stable long-run relationship between import demand and its determinants, real GDP, and relative prices. In estimating long run elasticities, the author finds an insignificant relationship between import demand and relative prices, and significant elasticity between import demand and GDP. However, short run income responsiveness is considerably greater than its long-run counterpart. Shareef and Tran (2007) examined Australia's aggregate import demand function from 1959 to 2006, using three different models including the Bounds test, the Engle-Granger's residual-based test, and the Johansen and Juselius test. All these models reinforce the conclusion that cointegration exists between imports and real GDP and relative prices. In the long run, the price elasticity is close to unity, while income elasticity is greater than 1. Narayan and Narayan (2005) approximated a disaggregated import demand model for Fiji for the period 1970 to 2000. They found that in the long- and short-runs, consumption, investment, and exports have an inelastic and positive impact on import demand, while relative price is negatively inelastic. Dutta and Ahmad (2004), utilizing the Johansan and Juselius model for the years 1971-1995, and including India's import liberalization policies as a dummy variable, found a cointegrated relationship between imports and its determinants. In the long run imports have a greater sensitivity to price changes, but in the short run adjustment process, real GDP drives import demand.

Very few efforts have been made to estimate aggregate import demand functions for Sub-Saharan African countries. Among them, Thaver and Ekanayake (2010) employed cointegration analysis to understand South Africa's aggregate import demand function. Their results reinforced other findings that imports depend positively on income and negatively on relative prices. They revealed that apartheid negatively impacted imports in the short run, but not in the long run. On the other hand, international sanctions affected imports positively in the short run and negatively in the long run. Akinlo (2008) employed a translog cost function to examine the substitution relations among capital, labor, and imports in Nigeria. Results demonstrate that domestic capital served as a substitute for both labor and imports. Razafimahefa and Hamori (2005), compared the aggregate import demand function of Madagascar with Mauritius from 1960-2000, and estimated a higher long-run income elasticity in Madagascar than Mauritius. At the same time, their long-run relative price elasticities were almost equal and highly elastic, demonstrating that Madagascar was more import dependent than Mauritius. Gumede (2000) studied the import demand function for South Africa from 1972-1997. His results indicate a long-run significant income elasticity of import demand, but short-run elasticities are insignificant.

The objective of the current study is to estimate South Africa's disaggregated import demand function with a specific African country, Nigeria. In addition to the traditional independent variables, our model includes foreign reserves and volatility as these variables have been shown to significantly influence import demand. In addition, we capture the impact of two policies, namely GEAR and NEPAD, on imports. This study is the first of its kind.

METHOD, MODEL SPECIFICATION, AND DATA SOURCES

In estimating South Africa's disaggregated import demand function with Nigeria we utilize the single-equation technique, which is appropriate given that its economic size and emerging status renders it a price taker in international markets. Its long-run disaggregated import demand function may therefore be specified as:

$$\ln M_t = \beta_0 + \beta_1 \ln RP_t + \beta_2 \ln FR_t + \beta_3 \ln VOL_t + \beta_4 \ln CG_t + \beta_5 \ln INV + \beta_6 \ln EXP_t + \beta_7 D_{1t} + \varepsilon_t \qquad (1)$$

The symbols in Equation (1), ln, M_t, t, RP_t,FR_t, VOL_t, CG_t INV_t, EXP_t, and ε_t denote respectively, the natural logarithm, the real import volume, time, the relative price of imports, real foreign reserves, exchange rate volatility, the sum of real government and private consumption expenditures, real investment, real exports, and the white noise. D_{1t} is a dummy variable representing South Africa's commitment (1996-2010) through GEAR and NEPAD to intra-African trade ; and ε_t is the error term.

In Equation (1), RP_t is computed as the ratio of import price to domestic price as measured by each country's CPI. Concomitant with economic theory, we expect β_1 to be negative. While FR_t does not appear in the traditional import demand function, it is an important determinant of imports for developing countries, so we include it in our model as more recent studies have done, for example Hoque and Yusop (2010). Since higher real foreign reserves tend to encourage imports, we expect that $\beta_2 > 0$. To convert CG_t, INV_t,, and EXP_t into real terms, we divide each by South Africa's GDP deflator (2005 = 100). Economic theory suggests that each of these components of income and expenditure is a major determinant of a country's imports and under the assumption of imperfect substitution theory, each has a positive impact on import demand. Thus we expect that the coefficients β_4, β_5, and β_6 will be positive. The expected signs of β_1, β_2, β_4, β_5, and β_6 are borne out in empirical results by numerous studies, among them, Thaver and Ekanayake (2010), Hoque and Yusop (2010), Akinlo (2008), Narayan and Narayan

(2005), Razafimahefa and Hamori (2005), Tang (2002, 2004), and Senhadji (1998). D_1 is defined to take the value 0 for years 1992 to 1996 and 1 otherwise. We hypothesize that the sign of β_7 will be positive.

VOL_t is a measure of exchange rate volatility and following Bredin, Fountas, and Murphy (2003), is measured as:

$$VOL_t = \left[\frac{1}{m} \sum_{i=1}^{m} (\ln RER_{t+i-1} - \ln RER_{t+i-2})^2 \right]^{1/2} \tag{2}$$

where RER_t signifies the real exchange rate, and m = 4 is the order of the moving average. Since the effects of VOL_t on imports have been found to be empirically and theoretically ambiguous (Bredin, et al. 2003), β_3 could be either positive or negative.

We employ the Bounds test model developed by Pesaran, et al. (2001) for our cointegration analysis because of three advantages over other models. First, it can be applied whether the regressors are purely I(0), purely I(1), or mutually cointegrated. Second, it avoids the need to ascertain the order of integration of the underlying regressors prior to testing the existence of a level relationship between two variables. Third, this method is robust for small and finite samples (Tang, 2002). In estimating the long-run model outlined by Equation (1), the model will distinguish the short-run effects from the model's long-run dynamics. For this purpose, Equation (1) must be specified in an error-correction model (ECM) format following Pesaran, et al. (2001), as has been used in many recent studies, including Hoque and Yusop (2010), Hye (2008), Narayan and Narayan (2005), Razafimahefa and Hamori (2005), Tang (2004), and Thaver and Ekanayake (2010). Using the bounds testing approach to cointegration analysis, we rewrite Equation (1) in an ECM format in Equation (3) below.

$$\begin{aligned} \Delta \ln M_t = {} & \alpha_0 + \sum_{i=1}^{n} \beta_i \Delta \ln M_{t-i} + \sum_{i=0}^{n} \delta_i \Delta \ln RP_{t-i} + \sum_{i=0}^{n} \eta_i \Delta \ln FR_{t-i} + \sum_{i=0}^{n} \gamma_i \Delta \ln VOL_{t-i} \\ & + \sum_{i=0}^{n} \psi_i \Delta \ln CG_{t-i} + \sum_{i=0}^{n} \vartheta_i \Delta \ln INV_{t-i} + \sum_{i=0}^{n} \xi_i \Delta \ln EXP_{t-i} + \alpha_1 D_{1t} \\ & + \lambda_1 \ln M_{t-1} + \lambda_2 \ln RP_{t-1} + \lambda_3 \ln FR_{t-1} + \lambda_4 \ln VOL_{t-1} \\ & + \lambda_5 \ln CG_{t-1} + \lambda_6 \ln INV_{t-1} + \lambda_7 \ln EXP_{t-1} + \omega_t \end{aligned} \tag{3}$$

All variables in equation (2) have been defined previously, except for the first difference operator, which is Δ. Equation (3) undergoes two procedural steps, the first employing the Wald test for the lagged level variables to inquire into the joint significance of the no cointegration hypothesis H_0: $\lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = \lambda_7 = 0$ against an alternative hypothesis of cointegration H_a: $\lambda_1 \neq 0$, $\lambda_2 \neq 0$, $\lambda_3 \neq 0$, $\lambda_4 \neq 0$, $\lambda_5 \neq 0$, $\lambda_6 \neq 0$, and $\lambda_7 \neq 0$. Pesaran, et al. (2001) provides two sets of critical values for a given significance level with and without a time trend. One assumes that the variables are I(0), and the other assumes that the variables are I(1). If the computed F-value exceeds the upper critical bounds value, H_0 is rejected signaling cointegration among the variables, whereas if the computed F-value falls below the critical bounds value, we fail to reject H_0. If the computed F-statistic falls within the bounds, the model renders inconclusive results. Once establishing a cointegrated relationship, the next step involves estimating the long-run coefficients model and their corresponding short-run dynamics, or ECM. The lagged error correction term (ECM_{t-1}) is important for the cointegrated system as it allows for adjustment back to long run equilibrium after a deviation from rest in the previous period. Since we use quarterly data, the maximum number of lags equals 4.

Equation (3) indicates that real imports are influenced and explained by its past values. From the estimation of ECMs, the long-run elasticities are the negative of the coefficient of one lagged explanatory variable divided by the coefficient of one lagged dependent variable. Thus for example, the long-run relative price and foreign reserves elasticity are (λ_2 / λ_1) and (λ_3 / λ_1) respectively. The short-run effects are captured by the coefficients of the first-differenced variables in Equation (2).

To estimate our model, quarterly data from January 1992 to December 2009 are used. The data series on nominal imports, the import price index, real GDP, foreign exchange reserves, and the domestic price index are taken from the International Monetary Fund's *International Financial Statistics Yearbook (2011)*. Nominal imports in *Rands* are deflated by South Africa's import price index (2005 = 100) to obtain the real import variable. To convert CG_t, INV_t, and EXP_t into real terms, we divide each by South Africa's GDP deflator (2005 = 100). The relative price of imports series is constructed as the ratio of the Nigeria's to South Africa's consumer price index, CPI (2005=100). To obtain the real foreign reserves series, we deflate the nominal foreign exchange reserves series by the GDP deflator.

EMPIRICAL RESULTS

Cointegration among Variables

Table 3 presents the Bounds test results of cointegration between imports and its independent variables. The computed *F*-statistic of 8.926 is higher than Pesaran et al.'s (2001) upper bound critical value of 4.43 at the 1 percent level, confirming that the null hypothesis of no cointegration cannot be accepted, and a unique cointegration relationship between real imports and its determinants exists in our model. That is, import demand is a function of relative prices, foreign reserves, exchange rate volatility, private and public consumption, investment, and exports. This result allows us to move to our next procedural step, namely, to estimate the associated long- and short-run elasticities.

Table 3: *F*- test Results for Cointegration of the Disaggregated Import Demand Model

Critical value bounds of the F-statistic: intercept and no trend						
	10 percent level		**5 percent level**		**1 percent level**	
k	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
6	2.12	3.23	2.45	3.61	3.15	4.43
Calculated F-statistic:						
$F_M(M \mid FR, RP, VOL, CG, INV, EXP)$			8.926***			

*Note: This table shows the results of the ARDL bounds testing for cointegration. The Critical values are taken from Pesaran, Shin, and Smith (2001), Table CI(iii) Case III, p. 300). k is the number of regressors. *** indicates the statistical significance at the 1 percent level.*

Long-Run and Short-Run Elasticities

Having established a long-run cointegrated relationship between import demand and its determinants, we now estimate the long- and short-run elasticities, the results of which we present in Tables 4 & 5. In Table 4, $\bar{R}^2$ is relatively high, indicating that the regressors reliably explain the long-run elasticities in the import demand function for South Africa's trade with Nigeria. However, not all long-run estimated elasticities exhibit the theoretically expected signs; neither are they all significant. The disaggregated expenditure variables are all elastic, and even though consumption (3.357) and export expenditures (1.766) are positive, they are not significant. While investment (-3.15) is significant at the 10% level, it negatively affects imports – for every 1% rise in investment, imports decrease by 3.15%, indicating a strengthening of South Africa's domestic investment climate. Real foreign reserves (0.025) and volatility (0.142) both yield expected signs but are highly inelastic and not significant in the long run.

Table 4: Long-run Elasticities for South Africa's Import Function with Nigeria: 1992-2010

Dependent variable: LnM_t		
Explanatory Variables	Coefficient	t-statistic
Constant	-36.315	-1.589
ln FRt	0.025	0.072
ln RPt	3.315	3.380***
ln VOLt	0.142	1.2248
ln CGt	3.357	1.239
ln INVt	-3.145	-2.361*
ln EXPt	1.766	1.576
D_1t	1.136	-1.4064
Adjusted R-squared (R^2)	0.654	

*Note: This table shows the long-run elasticities of the estimated import demand function for South Africa. *** and * indicate statistical significance at the 1% and 10% level, respectively.*

Relative prices, contrary to theoretical expectations, is directly related to import demand and is highly elastic (3.315), indicating that a 1% rise in relative prices correlates with a 3.3% increase import demand. This contradicts the results of several other studies, among them, Hoque and Yusop (2010), Thaver and Ekanayake (2010), Akinlo (2008), Tang (2002), Matsubayashi and Hamori (2003), and Senhadji (1998). However, because South Africa is highly dependent on oil imports, when relative prices increase, it will respond more elastically to its demand from Nigeria rather than other oil producing countries because of its more favorable trade balance with Nigeria relative to other countries. Congruent with this assertion, imports from Iran fell from a rank of 6 in 2009 to 10 in 2011, while Nigeria improved in rank from 10 to 8 (Department of Trade and Industry, 2011; Thaver and Ekanayake, 2010). Clearly, as other studies have pointed out, political movements and stability affect the import demand function for a specific country.

We present the estimated short-run elasticities in Table 5. In this case, unlike the long-run elasticities, most of the expected coefficient signs are met, and they are statistically significant. Consumption (-0.116) in the short run is negative, very inelastic, and significant compared with the long run. A 1% increase in exports (-1.913) will decrease import demand by 1.91%. Investment (2.608) positively affects imports so a 10% rise in investments yields an increase in imports of 26.1%. Real foreign reserves (0.765) is inelastic, but interestingly, relative price is highly elastic (-8.425), and statistically significant at the 1% level. Table 5 further reveals that the coefficient for D_1 is statistically significant at the 5% level so that in the short run, South Africa's commitment to increased intra-African trade significantly impacted its import demand function with Nigeria, but in an inverse manner.

This may be perplexing, but it is possible that rather than increasing trade with African countries, South Africa merely redirected trade from some African countries to others. Part of this redirection may also be due to its negative trade balance with Nigeria, despite its positive trade balance with African countries as a whole (Department of Trade and Industry, 2011). The error correction term, ECM_{t-1}, gauges the rate at which import demand adjusts to short-run deviations of its regressors before returning to its long run equilibrium level. In accord with theoretical expectations, the error-correction term of our short-run model is statistically significant at the 1% level with the expected negative sign. The coefficient for ECM_{t-1} is -0.586 indicating that once the model in Equation (3) is shocked by changes in one of the import demand determinants, convergence back to equilibrium is above average with 59% of the adjustment occurring in the first year. This may be due to several forces, among them, inertia and high transactions and adjustment costs, given that 99.5% of South Africa's imports from Nigeria is in the form of oil.

Table 5: Error-Correction Representation for the Selected ARDL Model

Dependent variable: $\Delta \ln M_t$		
Explanatory Variables	Coefficient	*t*-statistic
Constant	0.000	0.000
$\Delta\ln M_{t-2}$	0.214	2.660*
$\Delta\ln FR_{t-1}$	0.765	3.700***
$\Delta\ln VOL_t$	-0.214	-2.698***
$\Delta\ln RP_{t-2}$	-8.425	-5.473***
$\Delta\ln CG_{t-1}$	-0.116	-2.615**
$\Delta\ln INV_{t-1}$	2.608	3.226***
$\Delta\ln EXP_{t-2}$	-1.913	-2.414**
D_{1t}	-0.665	-2.504**
ECM_{t-1}	-0.586	-8.394***
Diagnostics		
R^2	0.754	
$\bar{R}^2$	0.693	
Durbin Watson Test	2.135	p-value: 0.598
Breusch-Godfrey Test	0.806	p-value: 0.527
Jarque Bera Test	3.768	p-value: 0.152

Note: This table shows the results of the short-run partial elasticities of the error-correction model.
**** and ** indicate statistical significance at the 1% and 5% level, respectively.*

None of the diagnostic tests in Table 5 is statistically significant, suggesting no evidence of autocorrelation in the disturbance of the error term. The model passes the Jarque-Bera normality tests indicating that the errors are normally distributed and the Durbin-Watson test for autocorrelation in the error term. Finally, the adjusted R^2 of 0.69 indicates that 69 per cent of the variation in import demand is explained by the variables in the model. Hence, based on these statistical properties, it is reasonable to say that the model is well behaved.

CONCLUSIONS, LIMITATIONS, AND SUGGESTIONS FOR FUTURE RESEARCH

In this paper, we estimated South Africa's disaggregated import demand function with Nigeria during 1992-2010 using the Bounds testing approach to cointegration. Our results suggest that a unique cointegration relationship between imports, relative prices, foreign reserves, exchange rate volatility, consumption, investment, and exports, exist. However, not all the long-run elasticities display theoretically expected signs; neither are they all significant. The disaggregated expenditure variables consumption and exports are positive, while investment negatively affects imports. Real foreign reserves and volatility yield expected signs, but relative prices, contrary to theoretical expectations, is directly related to import demand and is highly elastic. In the short run almost all the expected elasticity coefficient signs are met and they are all statistically significant.

Our study further discloses, contrary to our hypothesis, that South Africa's commitment to increasing intra-African trade through its GEAR and NEPAD policies applies inversely to Nigeria. This may be due to other neighboring oil producing countries such as Angola emerging on the trading scene. It may also represent South Africa's preoccupation with the west in enhancing its own trade position in the global economy. In our model none of the diagnostic tests is statistically significant, suggesting no evidence of autocorrelation in the disturbance of the error term. Further, the adjusted R^2 is high enough in both the short run and the long run, so we may conclude that variation in import demand is explained sufficiently by our variables in the model, and it is well behaved.

To our knowledge, this study is the first attempt of its kind by scholars to estimate post-apartheid South Africa's import demand function with Nigeria, let alone the rest of the African continent. The study is also consistent with other studies that demonstrate the superiority of a model that disaggregates GDP components, because not all its components are equally weighted in the import demand function. However, because of the long run lack of significance of most of the regressors, we tested an aggregate import demand model for the same period. The resulting diagnostic test results suggested that the aggregate model was not specified well. Similarly, the Wald test for cointegration revealed no cointegration between imports and its determinants. Therefore, even though our results in this model contradict expected signs based on theory and empirical results of other countries, we believe it is a valuable study and offer suggestions for further research that could overcome the limitations of the present model. Future studies, rather than using relative price as measured in this model, could use the crude oil price index, given that South Africa's imports from Nigeria is mostly in the form of crude oil. This may allow for better results overall. Also, since so few studies on import demand functions of African countries exist, it would be promising to estimate such functions for other African countries. In these studies, estimating the effect of GEAR and NEPAD policies on import demand with specific countries will inform policy makers of South Africa's successes and challenges in meeting its goals of African development and integration into the world economy.

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