Relationship between China's Economic Growth and South Africa's Exports to China

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Abstract: The rapid growth of China's economy has increased China's demand for imports required to meet the increased demand for raw materials in its industries. In 2006, China became the largest export destination for South Africa. This paper seeks to examine the relationship between China's economic growth and South Africa's exports to China. The paper aims to find out whether there is any significant relationship between China's economic growth and South Africa's exports to China. Using an import demand function for China, we employ an ARDL framework to analyze the research problem based on quarterly data covering the period 1992 to 2015. We find no evidence that there is a significant relationship between China's economic growth and South Africa's exports to China. However, the results do show that there is a positive long-run relationship between South Africa's exports to China and the price of South Africa's exports. The positive coefficient of South Africa's export prices indicates lack of price sensitivity in terms of South Africa's exports to China. Based on the results, we recommend that South Africa should find ways to enable its exports sector to benefit more from the high economic growth in China. Among other ways, this could be achieved through negotiating a free trade agreement (FTA) between South Africa and China.

Keywords: China; economic growth; South Africa; exports; import demand; bilateral trade

JEL Classification: F43

1. Introduction

Different studies have shown that the growth of China's economy has led to increase in exports of other countries to China due to the increased demand of raw materials and intermediate goods in China. China shifted from being and agricultural based economy to a mass industrialized economy, thus, increased

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demand for raw materials. (Robertson & Xu, 2010, p. 3) China's economy has been growing at a rate of over 8 per cent over the last thirty years and this rapid growth of China's economy has made the country to target the world as its market, but also, to become the most attractive trade destination in the current off-shoring process.[1] This kind of economic growth is expected to induce an increase in imports in China's economy to cater for the increasing domestic demand. In economics literature, economic growth is believed to lead to an increase in imports since high income promotes consumption. (Ugur, 2008) China has become a major trade partner to the Asian countries especially its neighbours. In 2003, China became the second export destination for Japan and the first for South. (Gaulier, Lemoine & Ünal-kesenci, 2005, p. 10) Evidence form Sub Saharan Africa shows that China's imports from Sudan, Burkina Faso and Ethiopia have increased significantly between 1995 and 2005, because of the increased demand for these countries' exports by China (Geda & Meskel, 2008). Regarding South Africa, evidence shows that there has been rapid increase in trade between China and South Africa. According to Villoria (2009, p. 532), South Africa's exports, most of which are minerals, account for about 18 per cent of African trade with China. In addition to that, South Africa is the major Sub-Saharan African exporter of manufactured goods to China. (Alden, 2008)

The purpose of this study is to examine short run and long run effects of China's economic growth on its imports from South Africa. In doing so, the study adopts Auto-regressive Distributed Lag (ARDL) approach to estimate Chinas' import demand function based on quarterly data from 1992 to 2015. The use of the ARDL modeling framework sets this study apart from previous studies that have also investigated China's trade with South Africa. Thus, this study differs from other studies in different ways. One way in which this study differs from previous studies is that it discusses the direct effect of China's economic growth on South Africa's exports to China. In addition to that, this study also assesses the long run effect of China's growth on its imports from South Africa. To the best of our knowledge, no study has examined long run effect of China's growth on its import from South Africa. Other previous studies, for example, Rangasamy & Swanepoel (2011), examine the impact of China's economic growth on South Africa's trade and inflation. Another Study by Sandrey & Jensen (2007) assesses the benefit of free trade project between China and South Africa from welfare perspective. This current study therefore, addresses some of the gaps in literature and by so doing, contributes to the body of literature on the economic effects of China in South Africa.

The results of this study reveal that there is no significant relationship between China's economic growth and its imports from South Africa. Notwithstanding this

[1] See (Eichengreen, Rhee & Tong, 2004; Zafar, 2007).

revelation, the study found that there is a positive relationship between South Africa's exports to China and the price of South Africa's exports. This positive effect of South Africa's export prices suggests lack of price sensitivity concerning South Africa's exports to China.

2. Literature Review

In the literature, relative price and real income are the major factors that affect demand for imports in a country. Some theories show that an increase in domestic income leads to an increase in consumption of both local and foreign goods. (Ugur, 2008) In the case of China, the rapid growth of the Chinese economy led to an increase in the demand for raw materials needed in the domestic industries. Brenton and Walkenhorst (2010) found that an increase in demand for raw materials from China provides opportunities for developing African exports and reduces reliance on traditional, but slow-growing markets in Europe and the United States of America. According to Henderson (2008, p. 378), the most important factors that contributed to China's growth was China joining the World Trade Organisation that opened for China doors for more international trade. It can be deduced that the growth of China's export industries influenced the increase in China's demand for imports from other countries. This argument is supported by international trade theories namely: firms based theory of international trade, and monopolistic competition and bilateral trade theory.

2.1. Firm Based Theory of International Trade and the Theory of Monopolistic Competition

Firm based theory of international trade demonstrates that exportation and importation of goods in a country occur because of firm's activities. "New trade theory" links international trade with innovation and productivity of firms. (Curiak, Lapham, Wolfe, Collins-Williams & Curtis, 2011) The theory identifies factors that determine firms' involvement and growth in international trade to include the level of resources, firm's international experience, intra-industry trade, bilateral trade cost, access to finance and productivity. Economic growth leads to firms specializations. Firm's specialisation creates rooms for intra-industry trade between international firms. Intra-industry trade occurs when countries export one set of industries and import another. Specialisation among industries that differ in factor intensity changes the relative demand for various factors of production. (Bernard, Jensen, Redding & Schott, 2012) Large shares of international trade take place between relatively similar trading partners, apparently within firms. Firms can serve foreign customers through different channels: they can serve them through foreign subsidiaries, or collaborate with foreign firms to produce their products, or

export their products directly to their customers. (Helpman, Meltz & Yeaple 2004, p. 300)

Krugman (1979) explains the theory of monopolistic competition that demonstrates how international trade may be driven by economies of scale that are prevalent in perfectly competitive markets. Firms in developed countries trade more with each other because they produce differentiated products with increasing returns. (Debaere, 2005, p. 249) Economies of scale reduces average cost of production, hence, making it possible for firms to purchase more capital, thus trade activities increase. Increasing returns to scale helps to explain bilateral trade by linking income levels of trading partners to trade volume between them. Literature shows that countries with similar economic growth levels tend to trade more between themselves.[1]

2.2. Effects of China's Growth on Trade with Other Nations

Among the different effect of China's economic growth, it can be argued that the effects of China's economic growth on trade in other countries have been both direct and indirect. The direct effects are due to China's increased demand for raw materials from other countries, whereas the indirect effects are as results of China's penetrating international markets through exportation of cheap goods meanwhile direct effects are mainly due to China's increased demand for foreign goods, mainly raw materials and machinery. Evidence of direct effect of China's economic growth has been shown in some countries in Sub-Saharan Africa. Using experiences of Sudan, Burkina Faso and Ethiopia, Geda & Meskel (2008) found that these countries' exports to China increased significantly because of the increased demand for their exports by China.

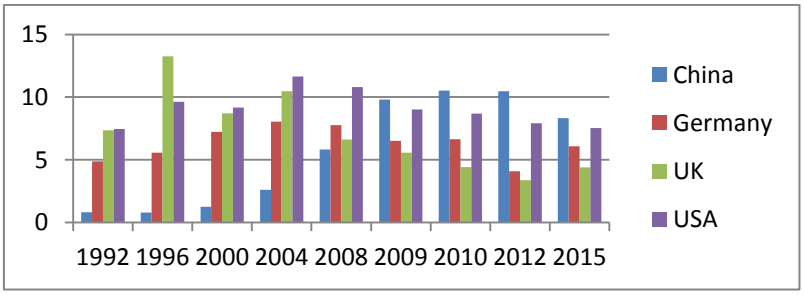
Despite the positive effects experienced in some economies due to trade with China, negative effects have been observed in other cases. Negative direct effects of China's economic growth on other countries are likely to occur when Chinese traders bring goods to other countries and compete with domestic traders. Lee (2007) reveals that in one of the Sub Saharan African countries, Uganda, local traders have been travelling to China for years to buy goods and sell in their local markets. However, in recent years, the Ugandan local traders are now experiencing stiff competition from Chinese traders who bring the same products into the country at a much cheaper price. The reason why China's products have been able to dominate domestic markets in Uganda is that in most respects, the domestic consumers are relatively illiterate and only care about price, not quality.

[1] See (Davis, 1995).

2.3. Trends in China's Economic Growth and South Africa's Exports to China

The growth of the Chinese market can be considered as one of the factors that have enabled South Africa to realise improvements in the volume of its exports. There is evidence of a rapid growth rate in bilateral trade between China and South Africa. This rapid growth in trade between China and South Africa has been due to a combination of burgeoning bilateral and of global factors. These factors include China's joining the World Trade Organisation in 2001 and the formal recognition of China's market economy by the government of South Africa (Alden & Wu, 2014). China created a new market for South Africa's exports during and after the great recession of 2009 that affected trade levels of industrialised countries. (Geld, 2010)

Figure 1. South Africa's total exports to China and SA's exports to the rest of the world 1992 – 2015



Source: World Integrated Trade Solutions

Figure 1 shows that between 1992 and 2012, South Africa's exports share to China grew by more than 10 per cent. On the other hand, South African exports to the United States of America (USA) and the United Kingdom (UK) decreased continuously from 2008 to 2012, after which they increased slightly in 2015. The trend depicted in the figure shows that South Africa's export destinations changed significantly over the period 1992 to 2012, resulting in China emerging as new dominant markets for South Africa's exports.

One of the factors that explain the increased trade between China and South Africa is that the growth of China's economy has led to an increased demand for power, which has caused China to increase its demand for cheap coal from South Africa. (Tu & Johnson-Reiser, 2012) Moreover, China's economic growth has also led to increase in demand for agricultural products from South Africa needed in feeding the growing population of China. Besides these, China uses some of the agricultural products from South Africa in domestic industries. (Sandrey & Edinger, 2009) Therefore, China's demand for South Africa's agricultural products is expected to increase due to the change in China's GDP, which has affected the

Chinese pattern of consumption of agricultural and food products. (Edwards & Lawrence, 2012, p. 8)

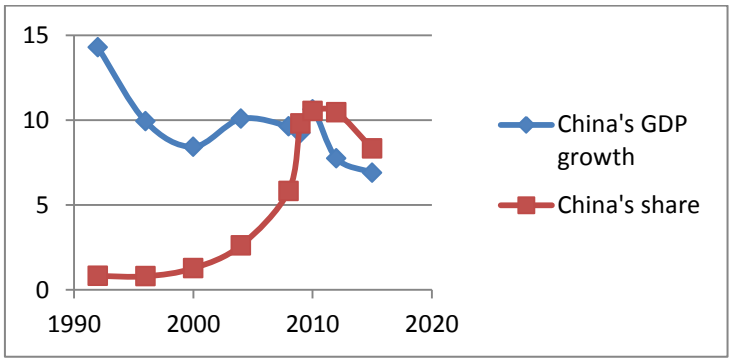


Figure 2. Trends in China's share in South Africa's exports and China's GDP growth

Source: World Bank (2015)

Figure 2 shows that between 1990 and 2015, there has been a positive relationship between China's GDP growth and its imports from South Africa. Although China's GDP growth declined in 1995, 2001, 2004 and 2011, most of the years registered positive changes in economic growth. China became the largest consumer of South Africa's commodities in 2006. Figure 2 also shows that the largest figure representing South Africa's exports to China was recorded in 2010, where South Africa's exports to China stood at 10.53%. (World Bank, 2015) Mineral resources are the major South African export to China, mostly iron and diamonds. South Africa also exports mining equipment to China, mostly in the form of vehicles, aircraft, vessels and associated transport and other machinery, and mechanical appliances. (Naidoo, 2007)

3. Model Specification and Data Description

Following Tripett & Thaver (2015), this study uses import demand function to estimate the effect of China's growth on its imports from South Africa. Traditionally, an import demand function is specified as a log-linear function of a relative price of imports and real income. (Senhadji, 1998) The log-linear representation allows the estimated coefficients to be interpreted as elasticities. The reason behind using income and price elasticity in the estimation of import demand function is their power in providing precise quantitative analyses that may result from the changes in income and prices. (Tripett & Thaver, 2015) Based on the Keynesian line of argument, it can be shown that an increase in domestic income may stimulate import demand, which could result in positive income elasticity. On

the other hand, an increase in relative price could hurt the demand for imports, yielding negative import price elasticity. (Tang, 2008)

The current study uses the following import demand function:

$$M_t = f(Y_t, RP_t, Z_t^m) \quad (1)$$

where M_t is China's imports from South Africa, Y_t is the real national income of South Africa, RP_t is the real aggregate price level and Z_t^m is a vector of other factors that affect imports. The current study will instead use the model to determine China's import demand function with South Africa by using GDP as the real national income of China and Price as South Africa's export price indices.

The empirical model for the current study is expressed as:

$$InExport_t = \beta 0 + \beta 1\, InGDP_t + \beta 2 InPrice_t \quad (2)$$

Where $Export$ is South Africa's total exports to China; GDP is China's gross domestic product; $Price$ is the real price of South Africa's exports.

3.1. Estimation Techniques, Data and Variable Construction

The data used in the empirical analysis of this study come from the National Bureau of Statistics of China and from the South African Reserve Bank. The sample period for this study starts from 1992 because of lack of bilateral trade data between South Africa and China prior to 1992. Nevertheless, the quarterly data from 1992 to 2015 enabled the study to come up with acceptable results owing to an adequate number of observations available to run the regression.

The study adopted the Auto-regressive Distributed Lag (ARDL) model's approach to estimate the regression. ARDL helps to estimate departures from and adjustments to the long-run equilibrium, and to distinguish between long-run and short-run effects. Specifically, the study used Pesaran's (2001) bounds testing procedure to estimate the model. Pesaran's bounds testing procedure has the advantage of being applicable in the presence of I(0) variables, I(1) variables, or any mix of the two. Thus, the bounds testing results are not dependent upon unit-root pretesting. The other advantage of the bounds testing procedure is that bounds' testing has been shown to be more efficient in small samples than either the Engle-Granger or Johansen tests for co-integration. (Tripett & Thaver, 2015) Thirdly, the ARDL approach circumvents the problem of order of integration associated with other methodologies. Fourthly, the technique generally provides unbiased estimates of long-run model and valid t-statistics even when some repressors are endogenous. It is also argued that the ARDL technique corrects endogeneity biasness. (Yue, 2010) Lastly, using the ARDL approach avoids the problems resulting from non-stationarity time series data. (Bathalomew, 2010)

The ARDL bounds test was used to test for the existence of a co-integrating relationship in the model. Using the ARDL approach, the calculated F-statistics are compared against the critical values. Each variable in the equation is taken as dependent variable in the calculation of the F-statistic.

The underlying ARDL model for the study is specified as:

$$\Delta Export_t = \beta_0 + \sum_{k=1}^{m} \beta 1i \Delta\, Export_{t-k} + \sum_{k=1}^{m} \beta 2i \Delta GDP_{t-k} + \sum_{k=1}^{m} \beta 3i \Delta Price_{t-k} + \varepsilon_t \quad (3)$$

The null hypothesis testing for no co-integration is given by:

$H_0 = \gamma_1 = \gamma_2 = \gamma_3 = 0$

which is tested against the alternative hypothesis:

$H_1: \gamma_1 \neq \gamma_2 \neq \gamma_3 \neq 0$

If the F-statistic falls below the lower bound, one cannot reject the null hypothesis of no co-integration, whereas if the F-statistic exceeds the upper bound, then the null hypothesis of no co-integration is rejected. An F-statistic between the lower and upper bound leads to an inconclusive test.

After having determined whether the long-run relationship existed, the parameters in the ARDL equation were estimated and interpreted. Specifically, the long-run elasticities are equal to the coefficients on the lagged regressors normalised by the negative of the coefficient on the lagged dependent variable. The short-run elasticities correspond to the coefficients on the first-differenced regressors. Subsequently, the error correction model (ECM) of the ARDL representation was estimated. In the ECM, the coefficient of the error-correction term, which is known as the speed of adjustment, shows the magnitude with which there is convergence towards long-run equilibrium. The ECM for the current study is given by:

$$\Delta Export_t = \beta_0 + \sum_{k=1}^{m} \beta 1i \Delta\, Export_{t-k} + \sum_{k=1}^{m} \beta 2i \Delta GDP_{t-k} + \sum_{k=1}^{m} \beta 3i \Delta Price_{t-k} + \alpha ECT_{t-1} + \varepsilon_t \quad (4)$$

where $Export$ represents South Africa's export to China, GDP is the real gross domestic product of China; $Price$ is the price of South Africa's exports; ECT is the error correction term, while m represents the maximum lag length. ε_t is the residual error term. The Schwarz Criterion (SC) and Alkaike Info Criterion (AIC) was used to determine the optimal lag lengths for estimation.

3.2. Discussion of Empirical Results

In the empirical exercise, the variables were first tested for stationarity using the Augmented Dickey Fuller (ADF) and the Phillips-Perron (PP) tests. Afterwards, the cointegration test as well as the estimation of the short-run and the long-run coefficients were conducted using EViews 9 software. After obtaining the

empirical results for the model of the study, diagnostic tests were carried out to determine the reliability of the results. Table 1 presents the results for the unit root tests.

Table 1. Unit root tests results

	ADF test				**PP test**			
Variable	In Levels		In First Difference		In Levels		In First Difference	
	Without Trend	With Trend	Without Trend	With Trend	Without Trend	With Trend	Without Trend	With Trend
Export	-1.07	-2.04*	-14.27***	-14.25***	-1.25	-3.26	-14.92***	-14.78***
GDP	-1.18	-2.69***	-10.32***	-10.26***	-1.49	-4.37	-18.35***	-18.24***
Price	-1.17	1.90	-10.74***	-10.78***	-1.27	-1.82	-10.76***	-10.81***

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

The unit root test in Table 1 indicate all the variables are non-stationary in levels. However, after first differencing, all the variables became stationary at 1 per cent level of significance, as shown in the table above. Thus, according to the ADF and PP tests, all the variables used in this study, namely $Export$, GDP and $Price$ are integrated of order 1 or are I (1). After confirming the stationary of the variables, the study estimated the ARDL model, after which the error correction model estimation was done. Table 2 presents the results of the long-run and short-run estimations.]

Table 2. Results of the Long-run and Short-run Estimations

Panel A: Short-run results			
Variable	**Coefficient**	**T-statistic**	**Probability**
GDP	-0.000972	-0.040437	0.9678
Price	0.003630	0.058768	0.9533
CointEq(-1)	-0.228420	-3.397540*	0.0010*
Panel B: Long-run results			
Variable	**Coefficients**	**T-statistics**	**Probability**
GDP	-0.170728	-0.0664361	0.5082
Price	2.944661	8.359699*	0.0000*
C	11.726197	6.804773	0.0000
Estimation output			
R –Squared	0.984609	Adjusted R-squared	0.983918
Sum Squared Residual	5.104354	F-statistic	1423.422

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

The results from Table 2 show that in the long run, the coefficient of China's GDP is positive but statistically insignificant. However, the coefficient of price is positive and statistically significant, in the long-run, showing that a 1 per cent

increase in South Africa's export prices will lead to a 2.94 per cent increases in South Africa's export to China. The results for the coefficient of South Africa's prices are puzzling in that the real price of South Africa's export is positively related to China's import from South Africa. The reason for these puzzling results could be that China mainly imports raw materials from the mining sector in South Africa. Most importantly, China uses these products as basic inputs. The results suggest that there is lack of price sensitivity in terms of China's imports from South Africa. Thus, the products that China imports from South Africa tend to be insensitive to price changes. Although puzzling, the results of this study are supported by Zhou & Dude (2011), who found a positive price elasticity for China when determining import demand function for India, Brazil and China. According to Zhou and Dube (2011), the explanation for the positive price elasticity of imports demand could lies in China's trade policy. China introduced a duty draw back system in the late 1980. The system allows duty rebates on imported raw materials, parts, components and so forth used in processing imports in China. This policy might have distorted the importing behaviour of China's importers and contributed to the positive price elasticity in the aggregate input demand estimation in China. The results for the current study further show that the error-correction term coefficient is negative, as required, and is statistically significant. The coefficient of determinations adjusted - R^2 shows that about 98.45 per cent variation in South Africa's trade with China is explained by the independent variables.

4. Conclusion

In this article, we have examined the relationship between Chinas' economic growth and South Africa's exports to China. Among other things, this study reviewed other literature on South Africa's trade with China, and examined the link between China's economic growth and South Africa's exports to China. In empirical investigation, the ARDL bounds testing approach to cointegration was used to estimate the relationship between China's GDP growth and South Africa's export to China.

The reviewed literature suggests that China's economic growth has led to increased demand in three major areas of South Africa's exports. Firstly, China's rapid economic growth has caused an increased demand for electric power, subsequently leading to an increase in China's demand for South Africa's coal. Secondly, China"s economic growth has also led to an increase in China's demand for South Africa"s agricultural products, especially wheat, corn, rice and sugar that are needed in feeding China's growing population. Thirdly, China's economic growth has led to increased industrialisation in China, which has increased China's demand for South Africa's raw materials. These raw materials include base metals,

textiles, precious and semi-precious metal, stones and wood products that are largely used in China's industries. South Africa's exports share to China grew by more than 10 per cent from 1992 to 2012. China has become South Africa's number one export destination ahead of USA and UK. It can be said that the growth of China's economy has led to South Africa moving away from its former predominant export destinations and towards China.

Based on the empirical results, the study finds no evidence that China's economic growth is related to South Africa's exports to China, whether in the short run or in the long run. The study further examines how South Africa's export prices affect China's imports from South Africa. The results for South Africa's export prices were puzzling in that the real price of South Africa's export was found to be positively related to China's import from South Africa. The positive effect of South Africa's export prices may be due to lack of price sensitivity in terms of South Africa's export to China. This could be because China mainly imports raw materials from the mining sector in South Africa, which Chinese industries use as basic inputs. Generally, the basic inputs tend to be insensitive to price changes.

The graphical evidence shows that China is currently experiencing a slowdown in its economic growth and this might reduce China's imports from South Africa if the slowdown is mainly in industries using inputs that South Africa exports. Nevertheless, the slowdown in China's growth could be a temporary scenario that might not affect South Africa's export to China. In conclusion, South Africa should explore how it can benefit from the high economic growth in China. This could be achieved through negotiating a free trade agreement (FTA) with China.

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