Effect of Opening-Up of Indian Economy on Indo-Southern African Trade

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Abstract

Adoption of NEP in 1990-91 was designed primarily to replace slowly growing closed Indian economy by rapidly growing open economy. The study determines the degree of openness of Indian economy and the profile of time path traversed towards this goal under NEP. The opening up of the closed economy is expected to have resulted in changes in magnitude, direction and composition of trade. So, the research question is 'has the quantum and structure of trade with traditional partners and new partners, if any, changed under NEP? The paper focuses only on Indo-Southern African trade since 1990-91. Rationale of this choice is that both Indian and some Southern African Economies are emerging market economies and these two have close relations for long. Statistical and Econometric models have been used for data analysis to furnish answers to the research question. The major findings of the study indicate that Southern African countries have emerged as new trade partners of India and highlight the need for greater policy focus in case of these new trade partners of India towards enhancing trade by exploring new opportunities.

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Introduction

Alfred Marshall (1891, 1960) hypothesized free international trade to be the engine of growth in general and capitalist growth in particular. Capitalist economies are, by and large, open with free trade regime as the pre-requisite for trade to become an engine of growth. The hypothesis has been formulated on the basis of observations and growth experience of economies of Europe, Japan and U.S. on the one hand, and prediction of classical theory of international trade on the other. Conventional theory of trade, enunciated by David Ricardo (1790), predicted the pattern of trade to be guided by comparative cost advantage in production. In two country two commodity model he highlighted that both the countries will derive gains in terms of greater output and lower costs/prices if they import and export goods on the basis of comparative cost advantage in production of individual goods within the countries.

Heckscher-Ohlin (1919, 1967) theory of international trade predicted the pattern and structure of trade to be governed and guided by Factor Endowment of the countries. If a capital rich country specializes in the export of capital intensive goods its cost and hence price shall be lower. Similarly, a labour abundant country can specialize in the production and export of labour intensive goods. Capital abundance implies lower cost (interest) of capital relative to wages; whereas, labour cost / wages relative to the cost of capital (interest) is generally lower in labour abundant countries. Leontief (1953) tested Heckscher- Ohlin's theory of factor endowment as determinant of composition of trade with empirical data of US economy and he found that US, a capital rich country was importing rather than exporting capital intensive goods. This is come to be known as Leontief paradox and it has inspired extensive empirical research. Economists like Rangnath Bharadwaj (1954), KN Prasad (1969) and Bharadwaj-Bhagwati (1969) tested Leontief paradox with Indian data but they found the composition of India's trade to be consistent with it's factor endowment. But he resolved the paradox by pushing labour productivity into the centre stage. It may be inferred that factor endowment theory uses comparative cost advantage, embodied in factor endowment as the base of pattern and structure of trade among the countries. Price of capital relative to wage cost of labour in a capital abundant and labour scarce country is lower. A capital abundant country has, therefore, comparative cost advantage over others in the production and export of capital intensive goods. This prediction of Heckscher-Ohlin theory has been found to be in dissonance with

observed facts in certain cases, while in others it conforms to observed facts. The factor endowment theory has been found to be empirically valid for the Indian economy (R Bharadwaj, 1954, Bharadwaj-Bhagwati, 1969). An interesting feature is that the factor endowment theory may hold true for trade of a country at macro level with the rest of the world but the observed pattern and composition of trade of this country with some country under bilateral trade agreement may not conform to the prediction of factor endowment theory. Thus, empirical evidence to support Leontief Paradox and evidence to support Heckscher-Ohlin theory is inconclusive (Bharadwaj, 1962, Bharadwaj and Bhagwati, 1969, Chakravarti, 2014). However, the empirical evidence shows that the dynamic economic growth and the consequent transformation of economic structure affect the structure of trade. Such changes in economic structure are concomitant with the growth related changes in factor endowment of the country. Consequently, inter-relations between growth, factor endowment and structure of trade change from lower to higher stages of economic growth. Relations among economic growth, changing commodity composition of trade and economic structure are characterized by multi- directionality. Besides, these relations involve leads and lags in the structure and direction of causalitsy. The national trade policy also plays the catalytic role in the altering of factor endowment in the process of growth. The industrialization based economic growth and development leads to not only the structural transformation of the economy but it also alters factor endowment which is accounted by temporal increases in capital accumulation/investment. In the post globalization era, there is a tendency of leveling of capital endowment and wage rates across the globe. Besides, factor reversibility radically alters scarcity of capital relative to labor both in quantitative terms and relative factor rewards which directly affect the pattern and structure of trade in the dynamic growth in a state of flux (Prakash, Anand, Sonia Dhir, 2014) and (Prakash, S., Sharma, Amit and Anand, Sonia Dhir, 2010).

A new paradigm has also emerged with substantial empirical support. With the establishment of European Union, a movement towards the formation of trade blocks has gathered momentum. We have US led trade block comprising U.S., Mexico, Canada, ASEAN and SAARC, SADIC etc. Under these groupings and bilateral trade agreements, trade is facilitated within the block which results in bits of restrictions on trade beyond the block. Establishment of WTO has also led to the intensification of bilateral and multilateral trade agreements.

After the Second World War, Soviet model of planned development was imitated by Eastern Europe and many developing countries. This model assigned low importance to international trade in development and substituted market by state and open by closed economy (Prakash, 1996). Restrictive trade practices also emerged in the midst of rising import bills for meeting the import requirements of growth on the one hand, and the need to fill up the gaps in dualistic and lopsided production structure through rapid industrialization on the other; it entailed heavy import of capital and intermediate goods. Scarcity of foreign exchange and realization of self-reliant and self-sustained economic growth warranted the substitution of imports by domestic production and establishment of highly capital intensive heavy and basic goods industries. This resulted in departure from free trade and partial closure of the economy; it later led to the adoption of liberalization, privatization and globalization. Globalization resulted in integration of large segments of the world economy; it resulted in the substitution of closed economy with the system of administered price mechanism by the open economy having market based pricing system. Administered prices are determined by executive fiats. Restricted and protected trade has also been replaced by fully or partially free trade. Resurrection of international trade as the philosophy of economic growth and policy paradigm associated with it resulted in implementation of the opening up of the closed economies for rapid growth; Policy of export-led growth has emerged as an important strategy of economic growth. Thus, international trade has been pushed into the center-stage as an instrument of economic growth which has made it an important component of economic analysis by globalization.

Growth and Welfare Gains of International Trade

Early economists focused on welfare gains of international trade. Such gains in consumption are derived from the access to cheaper and larger quantities of better quality imported goods; consumption of larger quantities of goods made possible by trade promotes welfare. However, growth gains from consumption multiplier were overlooked. The argument also overlooked the growth gains from the activation of investment accelerator by increase in savings due to less income needed to purchase cheaper imported goods; it seems to be implicitly assumed that all the enhanced purchasing power due to lower prices of imports is consumed; enhanced income/purchasing power effect on savings is thus overlooked. Growth gains of trade are partly accounted by Adam Smith's dictum that the development depends upon higher degree of division of labour and size of the market. Increased market size entails production on higher scale than

before which involves increase in capacity to produce, hence, increase in investment.

Subsequently, Marshall postulated trade as an accelerator or engine of growth. Trade has always had a beneficial impact on growth of output through the lowering of the prices and expansion of the size of market. P. N. Mathur (1962) was probably the first modern day economist to have formally distinguished the welfare and growth gains of international trade. He decomposed total gains into trade/welfare gains and growth gains. He used input output modeling for analytical purpose. Mathur (1988) explicitly incorporated Smith's postulation of positive growth effect of expanding market size in Strout-Leontief Gravity model resulting from South-South Cooperation. He used per capita income and population as two determinants of market size. The above review of selected paradigms furnishes the theoretical, methodological and empirical background of this study.

Indo-Southern African Trade

Southern and East African countries and India are not members of a formal regional grouping and they do not have free bilateral trade agreements also. But their trade does act as an economic bridge and as an instrument of augmentation of the market size for each other's products. Currently, the share of trade of Southern African countries in India's total trade is low. However, the countries of Southern African countries offer a great potential for India in terms of harnessing various opportunities for expanding the baskets of export commodities as well as services. For example, East African authorities like those of Tanzania have signed an agreement to give land on 99 year lease to the farmer's co-operative society of Andhra Pradesh for purposes of exploration and exploitation of their land resources (2015). Tanzania has also handed over gold and oil mining exploration rights to a group of MNCs (information gained from Tanzanian research scholars at BIMTECH). Encouraging developments like these can pave the way for healthier economic relations as well as mutual exploration and exploitation of development opportunities for both groups of countries. This paper examines the growth gains of India and Southern African countries from their mutual international trade. Therefore, the paper focuses on the contribution of trade to the growth of the economies of India and Southern African countries. This is the basic objective of the paper.

Sources of Data

All data used in this study for analysis are secondary in nature. Time series data relating to trade and GDP are taken from Economic Survey, Government of India, Ministry of Finance, New

Delhi, and CSO, Planning Commission, Government of India.

Methods and Models

Otiose type results emanate many times from specific models/methods. Results, derived by the application of some specific model or method to data may not be in consonance with logic or the results derived by the application of other methods/models. Quizical results may either be accounted by low power or sample size spread and mismatch or both of the method or model (For example, See, Jain, Rajesh, 2008). Multiple methods and models are used in this paper for avoiding the otiose type of empirical results from data analysis. Descriptive statistics is used to supplement econometric models. Besides, the results of descriptive statistics also capture the basic characteristics of time series data. Time series data comprises the following four components; seasonal, cyclical, systematic and random. But the annual time series data does not contain seasonal component, which is eliminated by aggregation or averaging. Cyclical component is generally removed by moving average method. This process of data massaging, however, eliminates the short run relation to focus on long run systematic trend. As this paper focuses both on short and long run relations between GDP and trade, it prefers to use the original time series data.

Distributed Lag Model

Distributed Lag Model (DLM) is used to derive the estimates of both short and long run relation between GDP and trade. DLM is preferred to error correction model (For Rationale, See, Sharma Sudhi, 2016, Khalid, Ramdhani, 2017).The estimates of parameter of reduced form equations depict short run relation between the core variables of DLM,, the structural parameters are derived from the parameters of reduced form equations which facilitates the quantification of structural equation(s); structural equation(s) represents the long run relation between the core variables. Thee distributed Lag Model is outlined below:

$Yjt^*=\alpha 0 +\alpha 1Xjt+ Ujt$……..(1)

Yjt^* is the desired or long term equilibrium value of Yj at time t, $\alpha 0$ and $\alpha 1$ are structural parameters of relation 1 and U is random error or error of estimation caused by non-systematic random changes in the values, Xjt is the pre-determined variable. However, actual change from one to another period in the value of Yj is only a fraction of te desired change to attain the long run equilibrium value:

$(Yjt- Yjt-1)= \lambda(Yjt^*- Yjt-1)$

Where λ is the coefficient of adjustment per unit of time and $0< \lambda<1$.

The equation is reorganized to obtain the unobserved value of Yjt^* in terms of the known values which is substituted in equation 1 to derive the following reduced form equation:

$Yjt= \lambda \alpha 0 +(1-\lambda) Yjt-1)+ \lambda \alpha 1Xjt+ \lambda Ujt$ Or

$Yjt= \lambda \alpha 0 +(1-\lambda) Yjt-1)+ \lambda\alpha 1Xjt+ \lambda Ujt$

$Yjt= II0+II1Yjt-1+II2\ Xjt +II3……..$ (3) $II0= \lambda \alpha 1$; $II1=(1- \lambda)$; $II2=\lambda\alpha 1$; $II3= \lambda Ujt$

Equation 3 is the reduced form equation which is derived from the combination of structural equations 1 and 2, IIs are the reduced form parameters from which the values of structural parameters, $\alpha 0$ and $\alpha 1$ are derived. The adjustment coefficient, λ may be used to estimate the proportion of desired adjustment is achieved during the specified period, say 3 years. It furnishes an idea about the discrepancy between the short and long run equilibrium.

The regression equation captures the influences of following three components: intercept or autonomous change in the values of the dependent variable, regression coefficients which capture the influence of the pre-determined variable(s) on the dependent variable, and random errors. In case of time series analysis, the intercept is likely to capture the impact of cyclical factors, since the intercept generally captures the influence of variables excluded from the regression relation. In this case, cyclical factors or their dummy is excluded from the regression equation.

Descriptive Statistics

There are four statistical features of the distribution of the values of the variables, which are captured and portrayed by the results of descriptive statistics. These are measures of (i) Location, (ii) Dispersion (iii) Departure from Symmetry and (iv) Concentration of Extreme Value in narrow space around the Mode. These values give the first hand information about the data and helps in revealing the important characteristics of the data in hand.

Random Walk Model and Dickey-Fuller Unit Root Test

As the non-stationary time series may furnish spurious regression results (Y A Yule, 1927), it is essential to test whether the time series is stationary. The mean and variance of the stationary time series are constant and the co-variance is not affected by the point of time at which it is calculated (Harvey, A.C., 1980). Several tests of stationarity have been evolved over the years. Each test has its strengths and weaknesses. Dickey-Fuller test is the most commonly used test for

evaluating whether the time series is stationary or not. The application of Dickey-Fuller test involves the use of Random Walk Model (RWM). The three alternative equations constitute the random walk model. All three versions of RWM without drift, with drift, and with drift and stochastic trend are outlined below:

$Yjt=\delta Yjt\text{-}1+Ujt\ldots$ (4)

This is Random Walk Model without Drift.

$Yjt=\beta 0+\delta Yjt\text{-}1+Ujt\ldots$ (5)

Tis is RWM with drift, $\beta 0$ is the coefficient of drift away from randomness.

$Yjt=\beta 0+\delta Yjt\text{-}1+\beta 1T+Ujt\ldots$ (6)

T is time measured in years and it represents the stochastic trend; δ and $\beta 1$ are the coefficients, subscript t stands for the year to which the value of the variable relates, while j=1, 2. 3, refers to GDP, Exports and Imports of India to and from Southern African countries.

But δ contains the root of the equation concerned, since $1+\delta=\rho$

But ρ is the root of the regression equation. The time series is stationary if $\rho<1$. If however, $\rho=1$, or $\rho>1$, then the series is non-stationary. Consequently, such regression equation will lie in te unit root circle and OLS estimates of the regression equation shall be spurious (Harvey, A.C., 1980). For the parametric estimates of the equation to be acceptable, Dickey-Fuller test requires $\delta<0$ and it to be statistically significant. Time series is considered to be stationary in such cases.

$Y1t$ refers to GDP/Growth of GDP;$Y2t$ stands for Exports/Growth of Exports, T stands for time measured in calendar years while t is time to which the value relates..

3.4. Growth Curve

Annual compound rate of growth has been estimated from the following exponential function: $\ln Yit=a+\beta T+\varepsilon\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots$ (7)

Where $\varepsilon=\ln U$; $a=\ln\alpha$; and β= Annual compound rate of growth of Yit. Equation 7 is derived from the following relation of comounding periodically: $Yjt=Yj0\,(1+g)^T$

Logrythmic transformation leads to the following relation:

$\ln Yit=\ln Yj0+\ln((1+g).T\ldots\ldots\ldots\ldots\ldots\ldots\ldots$ (8)

Conversion of this relation into econometric equation, which incorporates random errors in the relation furnishes equation 7 and β equals antilog of (1+g) -1. The equation is commonly used to derive estimate of annual compound rate of growth.

As the international trade and its growth, comprising exports and imports, are inevitably related to Gross Domestic Product (GDP0 and its growth, empirical analysis involves the determination of their respective growth. There exists the theory of trade, especially export trade led growth of the economy, while the level and structure of trade itself depends on GDP and its growth. Inter-temporal growth of exports requires the growth of output of exportable surpluses, growth of imports depends on the growth of capacity to pay import bills; rising import bills require export earnings to grow, since adverse balance of trade and oradverse balance of payments is not economically viable over a long period of time. Trade, in its turn, as has been explained earlier leads to the economic growth. This makes the analysis of growth of both trade and economy.

Regression Models

The regression models of exports and imports are specified as follows: $EXPRT_{aft} /EXPRT_{indt} = \alpha + \beta EXPRT_{indt}/GDP_{indt} + Ut$ …..(5)/9 $EXPRT_{saft} / EXPRT_{afr} = \alpha + \beta EXPRT_{aft} /EXPRT_{indt} + Ut$….(6)/10 $EXPRT_{kaft}/EXPRT_{saft} = \alpha + \beta EXPRT_{soaft}/EXPRT_{aft} + Ut$ …….(7)11

In above relations, EXPRT stands for exports of India, GDP for gross domestic product of India at factor cost, subscripts af, ind, saf, soaf refer to Africa, taken as a whole, India, South Africa, Southern Africa, which comprises 6 countries, i stands for one of the countries of Southern Africa, k=1,2,….,6.

These relations determine the shares of exports of specific spatial units in Indian exports. Similar regression models have been used for imports from Southern Africa. It has already been explained that exports depend mainly on exportable surplus of exported goods and exports to Southern Africa is only a fraction of total exportable surplus of India; this variable represents exports to Southern African countries per unit of total Indian exports, which represents the relative growth of exports to Southern African countries. The pre-determined variable of equation 9 shows total exportable surplus per unit of gross domestic output of India; thus, it represents the growth of Indian exports relative to the growth of GDP through time. It captures the influence of export growth on economic growth; it may relate to export led growth strategy, which India has been trying after the adoption of NEP. As South Africa is the largest trade partner of India among the Southern African countries, exports to countries of Southern Africa are taken relative to total exports toAfrica.

Regression relations of imports of India from Southern African countries are also formulated on similar reasoning. These are specified as under.

$IMPR_{aft}$ /$IMPRT_{indt}$ = α + β $IMPPRT_{indt}$/GDP_{indt} +Ut …..(8)/12 $IMPRTs_{aft}$ / $IMPRTafr$ = α + β $IMPRT_{aft}$ /$IMPRT_{indt}$ +Ut….(9)/13 $IMPRTj_{aft}$/$IMPRTs_{aft}$ = α + β $IMPRTso_{aft}$/$IMPRT_{aft}$ + Ut …….(10)/14

Test of Differences of Two Regressions and their Slope Coefficients

Often one is interested in determining whether two regressions are similar or statistically different. One may also be interested in evaluating the significance of slope coefficients of two or more regressions. The t-statistics for evaluation of the statistical significance of two slope coefficients is given below (Rosander, A.C., 1965). The similarity or statistical difference in two regression equations has also been explained in the text.

$$t = (b1-b2)\sqrt{\frac{(n1+n2-4)\,[\sum (x1i - \bar{x}1)^2 \sum (x2i - \bar{x}2)^2}{[\sum (y1i - \bar{y}1)^2 + \sum (y2i - \bar{y}2)^2]\,[\sum (x1-x1)^2 + \sum (x2-x2)^2]}}$$

If the intercept is positive and significant, it may conclusively be inferred that rising shares of African/Southern African/Country of Southern Africa in total Indian exports is explained by trade creation rather than trade diversion; but significant negative intercept need not necessarily, though it may represent trade diversion partially if the exports are not accounted by the growth of the total exportable surplus which has already been taken into account by the consideration of per unit of total exports. Increasing intensity of competition faced by Indian exports in the markets of Africa and Middle East, especially with China, may also make the intercept negative. The positive significant coefficient of the predetermined variable shows rise in the share of Indian exports to these markets due to the influence of the independent variable.

The reasoning underlying the specification of the dependent and independent variables in the above functions is based on the following considerations: (*Reference of Rosander already given, the above is based on reasoning outlined hereunder.)*

Exports /Imports to/from Africa are a part of overall exports/imports of India. Exportable surpluses are constrained by total commodity outputs and the year on year growth of output of different commodities and domestic consumption of the same. Surplus over domestic consumption may be treated as exportable surplus at any point in time;

India has to compete with other countries exporting to Africa. The competition is both in terms of quality and prices. Globalization and bilateral/ multilateral free trade agreements also play an important role in inter-country trade relations; and Trade and tariff policies of importing/exporting countries constitute the enablers/bottlenecks in the growth of exports;

All these factors individually as well as jointly affect Indian exports. The influence of variables, which are excluded from the regression, is captured by the intercept. So, if one or more excluded variables exert negative influence on the growth of exports, intercept may turn negative;

Analysis of Empirical Results

Results of application of different models/methods are taken up for discussion sequentially. First the results of descriptive statistics of time series data of exports to and imports from Africa and Southern African countries has been taken up; then the results of application of RWM are taken up for discussion. The reason of this sequencing is that the results of descriptive statistics generally reveal whether the distribution of the variables diverges from normality and hence, it is skewed and concentrated. In such cases, Dickey-Fuller test is likely to reveal the series to be non-stationary.

If the time series is not stationary, then the regression model furnishes spurious results. Application of RWM clears the decks for further analysis. Descriptive analytics of time series and OLS estimates of different versions of RWM are reported in the Tables I, II, III, IV and V.

Descriptive Statistics

Results are considered variable wise.

Indian Exports and Imports from Africa

Macro aggregates are the averages of values of micro units. The averaging smoothen the variability to a great extent. A perusal of the Table I and II reveals that the values of exports to and imports from African continent as a whole are not normally distributed over the years, since the value of t of the differences of their means and medians are greater than 2>1.96 at 0,05 probability level of significance. But the values of exports to and imports from individual Southern African countries are, however, normally distributed inter temporally due to non

significant t values and moderate variances for these countries.

India's Exports to Africa and Southern African Countries

Results pertaining to India's exports to and imports from Africa and Southern African countries are examined. OLS estimates of RWM of GDP and both overall exports and imports of India to Africa and country-wise exports and imports are reported in table III, IV and V.

None of the three series, reported in Table III, is stationary as the coefficients of lagged EXPRT and IMPRT are all positive and statistically significant except for GDP in the third version of RWM. Thus, the roots of equations of RWM of exports and imports lie in unit circle. This may warrant the application of Engel-Granger test of co-integration.

The results, reported in Table IV, indicate that India's total exports to Africa and all countries of Southern Africa are non- stationary; either the positive coefficients of lagged EXPRT are significant or the negative coefficients of RWM are not significant. Hence, all three versions of RWM show that the time series data of EXPRT to Africa is not-stationary.

Like exports to Africa and Southern African countries, imports from all these countries are not stationary. The results, shown in Table V, suggest the application of Engel-Granger Test to determine if residuals of the preferred regression functions are stationary.

Growth of Indo-African Trade

India has had economic and socio-political relations with Africa, especially with South Africa and East Africa since the days of British Rule in India and many African countries. The important question in this context is whether independent India's trade with Africa has expanded more or less rapidly than its trade with the rest of the word. In order to answer this question, growth curves have been fitted to the relevant data pertaining to India's exports to and imports from Africa and rest of the world. OLS estimates of these curves are reported in Table VI.

The growth curve is based on the assumption that time is the proxy variable, especially in case of developing countries, it captures the influence of all systematic factors that affect growth (Prakash, 1977). However, intercept of the growth curve, as usual, captures the influence of such sporadic or systematic factors that do not operate in the continuum of time and/or the influence of which is beyond the proxy variable. But significant negative slope coefficient may be

explained either by no or extremely low change in the variable or observed decline through time. In the second case, inverse relation between time and the dependent variable is inferred.

Growth of Exports

The table VI reveals that (i) the explained proportion of variation of the dependent variable is high for 6 growth functions of exports; but for Zambia, the coefficient of determination has a moderate value of 58 percent. In all other cases, its value ranges from 82 percent to 99percent;

(ii) Slope coefficients of all 7 growth curves are highly significant statistically, It means that the volume of Indian exports to Africa as a whole and six Southern African countries has grown at statistically significant rates; (iii) Intercept of all 7 growth curves of exports are also positive and significant; it implies that, besides the influence of systematic factors captured by time, other factors such as policy, state of the market, especially intensity of both price and quality competition have made Indian exports to Africa and Southern Africa rise consistently over the years; (iv) Indian exports to Africa, taken as a whole, and all countries of Southern African countries, except Zambia, have grown much more rapidly than total Indian exports to the world;

(v) India's exports to Zambia grew at an annual compound rate of 5.6 percent as against the growth of India's total exports at the rate of 7.1percent during the same period. These results lend substantial empirical support to the postulation of rapid growth of Indian exports to Africa, including Southern African countries.

Growth of Imports from Africa and Southern African Countries

The table VI reveals that (i) the growth curve fits the data of Indian imports also well in 6 out of 7 cases. Coefficients of determination are significant and values range from 61 percent to 99 percent except for Zambia. Thus, the growth of imports from Africa seems to have been in sync with the growth of exports; (ii) The coefficient of determination for Zambia is as low as 11 percent and it is also not significant; (iii) Intercept and slope coefficients are statistically significant for all countries except Zambia; (iv) But the slope coefficient of T for Zimbabwe is negative but statistically significant. The consistent decline in imports at an annual compound rate of 11.2 percent from Zimbabwe poses a concern. Accumulation of adverse trade balance of trade with India over a period of time will adversely affect Indian exports to Zimbabwe in the long run. Therefore, this may require policy intervention. Incidentally, Zimbabwe's economy has

been under stress for pretty long time due to certain domestic policies. Most of the large agricultural farms, the main stay of the economy, had traditionally been owned by erstwhile immigrants from Europe. The incorporation of legal provision for taking away the right of ownership from erstwhile owners might have adversely affected agriculture's exportable surpluses; (v) Imports from Angola grew at the highest annual compound rate of 47.8 percent. This appears to be the low base effect; (vi) Imports from total Africa, South Africa, Mozambique and Angola have grown much more rapidly than from the rest of the world; (vii) But imports from Zambia have increased at a rate slightly more than half of the rate at which total imports of India have grown. The results highlight the success of India's recent trade policy to look towards East and intensify the penetration into its traditional markets.

Growth Differentials of India's Exports to Africa and Rest of the World

As has already been explained, differences between the growth/regression equations and slope coefficients are examined by two alternative methods. Twin null hypotheses to be tested by the results of this section are that

$\alpha_1 - \alpha_2 = 0$ and $\beta_1 - \beta_2 = 0$

If both the hypotheses empirically hold, then, the two regression models do not differ significantly. The OLS estimate of regression of differences of Indian exports to rest of the world net of Africa and total exports to Africa as a whole on time is reported hereunder:

EXPRT = 1.722 - 0.028T, R^2 =0.8900, F=162.40; P= 4.66E-11 t: (57.63) (-12.74)

The fit of the curve to the data of differences of log values of two sets of exports is very good; it explains 898 percent of total temporal change in differentials of two sets of exports. The coefficient of determination is thus high and statistically significant. The slope coefficient is negative and highly significant; it shows that the differences between the year on year growth rates of Indian exports to Africa and growth rates to the rest of the world have been declining at an annual compound rate of 2.8 percent.

The same regression function may be fitted to the differences of log values of exports to different units of Africa.

Alternative t-test of Differences of Growth Rates of Exports to Africa and Southern African Countries

This test is applied to evaluate the statistical significance of differences of the slope(growth) coefficients of all growth curves of exports of India to Africa, Southern Africa and individual countries of Southern Africa. The values of t-statistic for all paired differences are reported in Table VII.

The table VII reveals that (i) Exports to Africa, taken as a whole, have grown at an annual compound rate which is significantly greater than the annual compound rate of growth of exports of India to the rest of the world. However, the rates of growth of exports to six countries of Southern Africa are not significantly greater than the rate of growth of exports to the Rest of the World. These results lend credence to the thesis of this paper that the difference between two or more regression equations cannot be adequately assessed only by the differences of the slope coefficients.

Differences of CAGR of Imports

It takes us to evaluate the growth equations and growth rates of Indian imports from rest of the world and Africa. OLS estimate of the differences of log values of the two sets of imports is given below:

IMPRT = 1.73 - 0.024T, R^2 =0.455, F=16.72, P= 0.00057 t : (22.0) (-4.09)

The growth function of differences of log values of imports from the rest of the world and Africa fits the data reasonably well. The explained proportion of variation is, however, moderate as it has a value of 45.5 percent. But the positive intercept and negative slope coefficient are statistically significant; the differences of imports from rest of the world and Africa decline at an annual compound rate of -2.4percent. It means that the imports from Africa have been growing much more rapidly than imports from the rest of the world. The results relating to exports and imports indicate that Indo-African trade has been growing more rapidly than the Indian trade with the res of the world. Policy initiatives and increasing Indo-African interdependence may account for these results.

The above inference is further examined by the evaluation of statistical significance of the annual compound rates of growth of imports from individual member units of Southern Africa. The values of t-statistics of differences between the paired annual compound growth rates of these units are reported in Table VIII. The table shows that the differentials of imports from Angola to India have been changing significantly, whereas the differentials are not statistically significant for any other paired growth rates. This implies that Africa and countries of Southern Africa jointly as well as individually

have been keeping pace with the growth of India's trade with the rest of the world so far as imports are concerned. Above results highlight the fact that Africa is emerging as an important trade partner of India despite rapid growth of Indian exports and imports to/from the rest of the world.

Temporal Changes in Proportionate Shares of Africa in Indian Exports and Imports

Relative growth of exports and imports to/from Africa is likely to affect the temporal shares of Africa in total exports and imports of India. If exports to Africa and Southern Africa grow more rapidly than the growth of total exports of India, Africa's and Southern Africa's shares will rise through time. Therefore, analysis of temporal changes in Africa's and Southern Africa's shares in India's exports and imports will also highlight the relative growth of India's trade with Africa.

Regression of Relative Exports and Imports of India to Africa and Southern Africa

The above results yielded by growth curves have prompted us to examine both joint and individual shares of Africa and Southern Africa in Indian exports and imports. But the choice of the denominator of the dependent variables, as has been already explained in the section dealing with methods and models is important in the analysis of relative shares in the process of growth of Indian economy and its trade with Africa. Shares of exports/imports to/from Africa as a whole have been related to total exports/imports of India; but the Southern African shares are related to Africa taken as a whole, while shares of individual Southern African countries have been calculated in relation to total exports to and imports from Southern Africa. The choice of dependent and independent variables is empirically validated by the OLS estimates of the regressions of these shares in exports and imports of India, which are shown in Table IX.

The function fits the data of shares of Africa, South Africa and Mozambique in Indian exports well in so far as the explained proportion of variation is concerned; values of the coefficient of determination range from 49.4 percent for South Africa to 87 percent for Africa. But 76.4 percent of total changes in Mozambique's share in Indian exports relative to Southern Africa are explained by the specified regression.

Intercept and slope coefficients of the regressions of the shares of Africa in total Indian exports, shares of South Africa and Mozambique in total Indian exports to Southern Africa on relevant independent variables are also statistically significant for these 3 cases. But the intercept of the regression of the

share of Africa in total Indian exports on total exports of India relative to its GDP is negative and significant for Africa, It implies that the share of Africa in total Indian exorts declines per unit of India's GDP. Thus, India tends to export less to Africa as its GDP grows; consequently, Indian exports to Africa falter as the Indian economy moves from lower to higher stages of growth. But the intercept is positive and significant in case of Southern Africa and Mozambique. It implies that the factors other than total exports of India relative to its GDP exercise positive influence on India's exports to Africa relative to total exports to Africa from India. This may probably be explained by the changing state of the market and domestic constraints of African countries. However, these very factors influence temporal changes in shares of Southern Africa and Mozambique in total Indian exports to Africa/Southern Africa positively. The negative slope coefficient of Mozambique implies that the Indian exports to Mozambique grew relatively at a lower and slower rate than the Indian exports to Southern Africa as a whole. As against this, change in India exports per unit of GDP leads to an increase in shares of Africa in Indian exports. Export led growth seems to find some support in this case.

Regression functions fit poorly to the data of other Southern African countries. Though African continent had been in Indian focus for long, yet trade relations with South Africa have been much older than those with other countries of Southern Africa for which data are available only for six years from 2005-6 onwards to 2011-12. Limited number of observations may account for such results. As these countries have emerged as new trade partners of India, it may take some more time to consolidate these preliminary gains. The poor fit of the function may partly be due to limited observations and low shares in Indian exports of new trade partners. This highlights the need for greater policy focus in case of these African trade partners of India.

Regression Functions of Africa's Share in Indian Imports

Share of Africa in total imports of India is regressed on total imports of India per unit of its GDP; Share of Southern Africa in total Indian imports of India is regressed on total imports of India from Southern Africa per unit of Indian imports from Africa; and shares of each individual Southern African countries in total Indian imports from Southern Africa are regressed on Southern African shares on Southern African imports per unit of Indian imports from Africa. OLS estimates of country wise regression equations are reported in table X. A brief discussion of results is appended herewith.

The specified functions fit the import data well only for Africa as a whole and Mozambique in so far

as the significance of the coefficient of determination is concerned. However, the coefficient of slope is significant only for Africa taken as a whole. This is the only case for which the function may be acceptable on statistical grounds. Incidentally, positive intercepts are significant for Southern Africa, South Africa and Zambia. It implies that the excluded variables exercise much greater influence on Indian imports from these countries than the pre-determined variables included in the equations. This highlights inappropriate choice of factors of determination of imports into India from these countries. Besides, the poor fit of these functions may probably be explained by the low exportable surpluses in these economies. In any case, India has much more to offer by way of exports to Africa in near future than what African countries may be in a position to offer to India, unless these countries industrialize much more rapidly than in the past.

Alternative Distributed Lag Models

Results of regression models discussed so far suggest evaluation of the results of alternative distributed lag models of both exports to and imports from Southern African Countries. The county wise OLS estimates of these functions are reported in tables XI and XII respectively.

Discussion of Results of Exports

The DLM functions of quantum of exports fit the data much better than the earlier functions since (1) Coefficient of multiple determination is statistically significant in all five cases now; (2) Explained proportion of inter-temporal ranges in Indian exports ranges from 48% for Angola to 78.3% for Zambia; its value is 78% for South Africa and lies between 66 and 72% for Mozambique and Zimbabwe; (3) The coefficient of multiple correlation and short run regression coefficients are statistically significant in all five cases.

The short run relation of Indian exports to Indian GDP positive ad significant. But the attainment of long run equilibrium involves different lengths of time period for different countries. Exports to Angola take the longest period to move from short to long run equilibrium; adjustment of short to long run equilibrium takes for South Africa and Zambia takes slightly mor than three years, while the adjustment for Mozambique and Zimbawe takes slightly less than three years. The Indian exports to all five coutries of Southern Africa grow with the growth of Indian economy. In other words, the growth of output/GDP leads to larger quantum of exportable surpluses, exports to Southern Africa also grow in consonance with their shares in total Indian exports. But the exports of preceding year are the benc mark over which current exports grow which exercise greater influence on current exports than GDP.

Discussion of Results of Imports

DLM of imports from Southern African countries present very interesting results: (1) The DLMs fit the data of all five countries well so far as the coefficient of multiple correlation is highly significant statistically; (2) The explained proportion of variation ranges from the minimum 37.1% for Zimbabwe to 91% for Mozambique; (2) The DLM also explains 78, 79 and 83% of total year on year variation of imports from South Africa, Angola and Zambia respectively; (3) As in case of exports, preceding period's imports constitute the bench mark and influence imports more decisively than GDP. International trade operates on the advance orders execution of which involves time; (4) Adjustment of short to long run equilibrium is completed in 2 to 3 years in all five cases.

Major Findings of Study

(i) The time series of exports and imports with Africa reveal distributions to be normal only in the case of Africa as a whole. However, distributions of twin time series of individual countries diverge from normality. The main reason behind this divergence is the presence of limited observations, since some of these countries are new trading partners of India.

(ii) Such systematic factors as policy, state of the market and intensity of price and quality competition have made Indian exports to Africa and Southern Africa rise consistently over the years.

(iii) Indian exports to Africa as a whole, and countries of Southern Africa, except Zambia, have grown more rapidly than Indian exports to the rest of the world. Imports from Africa have grown more rapidly than imports from the rest of the world.

(iv) The time series models of imports from Southern African countries to India fit the data well except for Zambia; Intercept and slope coefficients are statistically significant for all countries except Zambia.

(v) Consistent decline in imports at an annual compound rate of 11.2% from Zimbabwe is a concern. Accumulation of adverse trade balance with India over a period of time might adversely affect Indian exports to Zimbabwe in the long run. Therefore, this requires policy intervention. The legal deprivation of ownership rights to erstwhile owners of the farms adversely affected exportable

surpluses.

(vi) Imports from Angola show a promising picture. Imports from total Africa, South Africa, Mozambique and Angola have grown more rapidly than from the rest of the world.

(vii) Differences between the year on year growth rates of Indian exports to Africa and growth rates to the rest of the world have been declining at an annual compound rate of 2.8%. If exports to Africa and Southern Africa grow more rapidly than the growth of total exports of India, Africa's and Southern Africa's shares will rise through time.

(viii) Factors other than total exports of India relative to its GDP exercise inverse influence on India's exports to Southern Africa relative to total exports to Africa from India. This may be explained by the changing state of the market and domestic constraints of African countries. However, these very factors influence temporal changes in shares of South Africa and Mozambique in total Indian exports to Africa/Southern Africa positively.

(ix) Negative slope coefficient of Mozambique implies that the Indian exports to Mozambique grew relatively at a lower rate than the Indian exports to Southern Africa as a whole. As against this, change in India exports per unit of GDP lead to an increase in shares of Africa in Indian exports.

(x) Both lagged exports and imports exercise greater influence on current exports and imports than GDP; preceding exports/imports act as the bench mark for current growth.

(xi) African continent had been in Indian focus for long and trade relations with South Africa are much older than those with other countries of Southern Africa. Southern African countries have emerged as new trade partners of India.

(xii) This highlights the need for greater policy focus in case of these new trade partners of India towards enhancing trade by exploring new opportunities.

Policy Implications and Suggestions for Research

Economic structure of African continent accounts for its more prominent trade relations with countries outside Africa than with the countries within Africa. Stage of development and natural resource endowment of countries require identification and exploration of complimentary sectors for investment and expansion of trade basket for all trade partners.. Southern African countries are very rich in mining and mineral resources which makes it imperative to group them to map out their production and export programs for future sustainable industrialization..

Future Research

Our study is aggregative in nature. So, it uses aggregative data. It will be useful if commodity wise data are analysed in future research.

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Tables

Table I : Descriptive statistics : Imports - Africa and Southern African countries

Imports	*Africa*	*South Africa*	*Mozambique*	*Zambia*	*Zimbabwe*	*Angola*
Mean	33732.86	24086	278.1429	474.1429	83.71429	12415.57
Standard Error	11644.15	5036.679	54.30269	122.1602	15.77779	4728.411
Median	5876.5	24882	224	390	90	6539
Standard Deviation	54615.91	13325.8	143.6714	323.2055	41.74412	12510.2
Sample Variance	2.98E+09	1.78E+08	20641.48	104461.8	1742.571	1.57E+08
Kurtosis	4.130593	0.21034	-1.60708	-0.77597	-0.11799	-1.47338
Skewness	2.102375	0.828216	0.578382	0.808916	-0.1122	0.588476
Range	204837	36699	340	847	127	31844
Minimum	959	10944	128	145	19	14
Maximum	205796	47643	468	992	146	31858
Sum	742123	168602	1947	3319	586	86909
Count	22	7	7	7	7	7
CV	161.9071	55.32591	51.65382	68.16627	49.86499	100.7622

Normality	2.392305	-0.15804	0.997057	0.688791	-0.39839	1.242822

Value of t	Normal	Normal	Normal	Normal	Normal	Normal

Source : authors own calculations

Table II – Descriptive Statistics: Exports - Africa and Southern African countries

Exports	*Africa*	*South Africa*	*Mozambique*	*Zambia*	*Zimbabwe*	*Angola*
Mean	23145.23	10418.33	1736.143	540.1429	288.2857	1807
Standard Error	6698.694	2120.183	304.4519	85.41925	76.31848	375.4931
Median	7142.5	9751	1795	491	229	1704
Standard Deviation	31419.66	6360.548	805.5041	225.9981	201.9197	993.4613
Sample Variance	9.87E+08	40456575	648836.8	51075.14	40771.57	986965.3
Kurtosis	3.436372	0.602463	-0.93623	4.460671	-0.66658	-1.82084
Skewness	1.901316	0.936869	-0.28201	1.838581	0.980364	0.312786
Range	118000	20249	2203	721	513	2423
Minimum	668	2478	565	295	106	672
Maximum	118668	22727	2768	1016	619	3095
Sum	509195	93765	12153	3781	2018	12649
Count	22	9	7	7	7	7
CV	135.7501	61.0515	46.39619	41.84043	70.04153	54.97849
Normality Valuesoft	2.388932 Not Normal	0.314753 N ormal	-0.19332 Normal	0.575314 Normal	0.77682 Normal	0.274306 Normal

Source: authors own calculations

Table III- Estimates of RWM: India's GDP, Exports and Imports

Variable	β_0	Δ	β_1	R^2	t_1	t_2	t_3	F
GDP	-	0.074		0.94		18.51		342.78
GDP	- 59712.7	0.094		0.82	-2.16	9.58		91.84
GDP	- 35661.5	0.055	7071.85	0.83	-1.003	1.45	1.06	46.84

Total EXPRT	0	0.22		0.78		8.64		74.69

Total EXPRT	-9458.81	0.24		0.67	-0.55	6.24		39.05
Total EXPRT	-998.59	0.269	-1608.15	0.67	-0.03	2.96	-0.349	18.68
Total IMPRT	0	0.24		0.73		7.52		56.66
Total IMPRT	-9296.51	0.25		0.61	-0.29	5.55		30.80
Total IMPRT	-13136.4	0.25	645.23	0.61	-0.225	2.47	0.078	14.59

Source: Author's own calculations

Table IV-Results of RWM: EXPRT to Africa and Countries of Southern Africa

Country	β_0	Δ	β_1	R^2	t_1	t_2	t_3	F
Africa	0 3.5 -1678.16	0.302 0.301 0.247	 244.98	0.57 0.44 0.451	0 0.001 -0.37	5.15 3.91 1.66	 0.43	26.61 15.31 7.42
South Africa	0 1475.109 1004.88	0.25 0.11 -0.46	 1250.107	0.435 0.034 0.25	0 0.57 0.405	2.33 0.46 -0.861	 1.221	 0.21 0.86
Mozambique	0 944.99	0.106 -0.383		0.094 0.29	0 1.808	0.72 -1.29		0.522 1.66
Zambia	0 165.189	0.249 -0.097		0.28 0.0019	0 0.322	1.404 -0.089		1.97 0.0079
Zimbabwe	0 71.64 -29.9	0.285 0.059 -0.948	 96.135	0.304 0.005 0.578	0 0.66 -0.312	1.478 0.148 -1.628	 2.019	2.18 0.022 2.059
Angola	0	0.029		0.007	0	0.188		0.035

	849.43	-0.341		0.257	1.467	-1.176		1.38

Source: Author's own calculations

Table V-Results of RWM: IMPRT from Africa and Countries of Southern Africa

Country	β_0	δ	β_1	R^2	t_1	t_2	t_3	F
Africa	0	0.378		0.81	0	9.284		86.21
	113.71	0.377		0.74	0.048	7.533		56.75
	-2091.69	0.343	279.01	0.753	-0.44	4.23	0.53	27.45
South Africa	0	0.309		0.71	0	3.53		12.52
	-823.05	0.344		0.31	-0.14	1.35		1.82
	2636.97	-1.05	7067.81	0.669	0.543	-1.31	1.79	3.041
Mozambique	0	0.114		0.088	0	0.695		0.483
	67.73	-0.109		0.017	0.602	-0.266		0.07
Zambia	0	-0.236		0.0061	0	-0.573		0.329
Zimbabwe	0	-0.182		0.214	0	-1.16		1.36
Angola	0	0.365		0.47	0	2.12		4.51
	3939.21	0.149		0.097	1.34	0.659		0.434
	-6705.9	-0.846	5651.06	0.675	-1.33	-1.04	2.31	3.12

Source: Author's own calculations

Table VI-Growth Curves of India's Overall and Indo-African Trade

Exports	β_0	β_1	R^2	F	t_1	t_2
India	4.52	0.071	0.992	2608.5	246.40	51.07
Total Africa	2.797	0.100	0.904	1250.9	75.10	35.36
South Africa	3.44	0.099	0.861	43.4	40.46	6.58
Mozambique	2.764	0.105	0.815	22.2	27.63	4.70

Zambia	2.47	0.056	0.581	6.96	25.75	6.62

Zimbabwe	1.847	0.130	0.897	43.88	20.94	6.62
Angola	2.755	0.109	0.817	22.33	26.58	4.72
Imports						
India	4.54	0.078	0.989	1944.93	194.43	44.10
Total Africa	2.813	0.103	0.918	225.32	31.20	15.01
South Africa	3.87	0.111	0.959	118.75	85.03	10.89
Mozambique	2.063	0.082	0.61	7.85	15.67	2.80
Zambia	2.392	0.047	0.107	0.605	0.0003	0.471
Zimbabwe	2.307	-0.112	0.693	11.30	15.365	-3.36
Angola	1.626	0.478	0.777	17.509	3.18	4.20

Source: Author's own calculations

Table VII-Values of t-Statistics of differences of CAGR of Exports

	Differences of CAGR of Exports	t values
	India and Africa as a whole	2.96
	India and South Africa	1.25
	India and Mozambique	1.033
	India and Zambia	0.432
	India and Zimbabwe	1.599
	India and Angola	1.130

Source: Author's own calculations

Table VIII-Values of t-Statistics of Differences of CAGR of Imports

	Differences of CAGR of Imports	t values
	India and Africa as a whole	0.86
	India and South Africa	0.147

	India and Mozambique	0.029

	India and Zambia	0.223
	India and Zimbabwe	1.390
	India and Angola	2.735

Source: Author's own calculations

Table –IX- Regression Functions of Shares of Africa in Indian Foreign Trade

Dependent variable	Independent variable	α	B	R^2	F	t_1	t_2
Indian exports to Africa/ Exports of India	Total exports of India / GDP of India	-0.019*	0.576*	0.870*	128.186	-3.41	11.32
Exports to Southern Africa/Total Indian exports to Africa	Total Indian exports to Africa / Total exports of India	0.416*	-1.718	0.232	1.209	4.083	-1.09
Exports To South Africa / Exports To Southern Africa	Exports to Southern Africa/Total Indian exports to Africa	0.298	1.429*	0.494*	3.91	1.34	1.97

Exports To Mozambique / Exports To Southern	Exports to Southern Africa/Total Indian	0.352*	-0.812*	0.764*	12.987	5.104	-3.603

Africa	exports to Africa						
Exports To Zambia / Exports To Southern Africa	Exports to Southern Africa/Total Indian exports to Africa	0.011	0.069	0.115	0.321	0.403	0.721
Exports To Zimbabwe / Exports To Southern Africa	Exports to Southern Africa/Total Indian exports to Africa	0.237	-0.572	0.150	0.709	1.38	-0.842
Exports To Angola / Exports To Southern Africa	Exports to Southern Africa/Total Indian exports to Africa	0.172	-0.912	0.032	0.125	1.020	-0.353

Source: Author's own calculations

Table X- Regression Functions of Shares of Africa in Indian Foreign Trade

Dependent variable	Independent variable	α	β	R^2	F	t_1	t_2
Indian imports to Africa / Imports of	Imports of India / GDP of India	-0.00099	0.269*	0.634*	32.956	-0.137	5.740

India							
Imports to Southern Africa/Indian imports to Africa	Indian imports to Africa / Imports of India	0.443*	-0.603	0.0099	0.0501	2.719	-0.223
Imports To South Africa / Imports To Southern Africa	Imports to Southern Africa/ Indian imports to Africa	0.637*	0.210	0.029	0.153	2.78	0.392
Imports To Mozambique / Imports To Southern Africa	Imports to Southern Africa/ Indian imports to Africa	-0.0004	0.023	0.352*	2.724	-0.061	1.650
Imports To Zambia / Imports To Southern Africa	Imports to Southern Africa/ Indian imports to Africa	0.028*	-0.029	0.123	0.701	1.912	-0.837
Imports To Zimbabwe / Imports To Southern Africa	Imports to Southern Africa/ Indian imports to Africa	0.0036	0.0018	0.0026	0.0133	0.551	0.115

Imports To	Imports to	0.331	-0.206	0.024	0.123	1.322	-0.351

Angola / Imports To Southern Africa	Southern Africa/ Indian imports to Africa						

Source: Author's own calculations

Table XI- Structural Parameters of Distributed Lag Model

GDPt = a0 + a1GDPt-1+ a2EXPt								
	Adjustment parameters					Long term structural parameters		
Country	λ1 (adjustment in period 1)	λ2 (adjustment in period 2)	λ3 (adjustment in period 3)	λ4 (adjustment in period 4)	λ5 (adjustment in period 5)	α0	α1	α2
South Africa	-0.045	-0.09202	-0.18819	-0.38485	-0.78702	-1.1E+07	1.045	-87.3333
Mozambique	-0.028	-0.05678	-0.11516	-0.23354	-0.47362	-2E+07	1.028	-927.5
Zambia	-0.027	-0.05473	-0.11094	-0.22487	-0.4558	-2E+07	1.027	-4932.22
Zimbabwe	-0.028	-0.05678	-0.11516	-0.23354	-0.47362	-2E+07	1.028	-7203.93
Angola	-0.052	-0.1067	-0.21896	-0.4493	-0.92196	-7490454	1.052	-1033.65

Source: Authors own calculations

Table XIa- Structural Parameters of Distributed Lag Model

GDPt = a0 + a1GDPt-1+ a2IMPt								
	Adjustment parameters					Long term structural parameters		
Country	λ1 (adjustment in period 1)	λ2 (adjustment in period 2)	λ3 (adjustment in period 3)	λ4 (adjustment in period 4)	λ5 (adjustment in period 5)	α0	α1	α2
South Africa	-0.061	-0.12572	-0.25911	-0.53403	-1.10063	-8257775	1.061	35.67213
Mozambique	-0.112	-0.23654	-0.49958	-1.05511	-2.2284	-2017300	1.112	1341.786
Zambia	-0.105	-0.22103	-0.46526	-0.97937	-2.06157	-2571599	1.105	1089.429
Zimbabwe	-0.094	-0.19684	-0.41217	-0.86309	-1.80732	-4355948	1.094	17763.09
Angola	-0.074	-0.15348	-0.31831	-0.66017	-1.3692	-6773159	1.074	107.3243

Source: Authors own calculations

Table XIb- Structural Parameters of Distributed Lag Model

IMPt = a0 + a1IMPt-1+ a2GDPt		
	Adjustment parameters	Long term structural parameters

Country	λ1 (adjustment in period 1)	λ2 (adjustment in period 2)	λ3 (adjustment in period 3)	λ4 (adjustment in period 4)	λ5 (adjustment in period 5)	α0	α1	α2
South Africa	0.367	0.599311	0.978675	1.598176	2.609821	18789.89	0.633	0.002044
Mozambique	0.235	0.414775	0.732078	1.292117	2.280587	-3418.6	0.765	0.000638
Zambia	0.032	0.062976	0.123937	0.243908	0.48001	-28026.3	0.968	0.005
Zimbabwe	0.969	0.999039	1.030009	1.061939	1.09486	-46.4861	0.031	2.06E-06
Angola	0.043	0.084151	0.164684	0.322286	0.630713	270622.6	0.957	-0.02326

Source: Authors own calculations

Table XIc- Structural Parameters of Distributed Lag Model

EXPt = a0 + a1EXPt-1+ a2GDPt								
	Adjustment parameters					Long term structural parameters		
Country	λ1 (adjustment in period 1)	λ2 (adjustment in period 2)	λ3 (adjustment in period 3)	λ4 (adjustment in period 4)	λ5 (adjustment in period 5)	α0	α1	α2
South Africa	0.287	0.491631	0.842164	1.442627	2.47122	12802.96	0.713	0.00122
Mozambique	0.611	0.848679	1.178815	1.637374	2.274313	-2217.45	0.389	0.000851
Zambia	0.308	0.521136	0.881762	1.491941	2.524365	208.8312	0.692	1.3E-05

Zimbabwe	0.585	0.827775	1.171302	1.657392	2.345209	-188.684	0.415	1.03E-05

Angola	0.179	0.325959	0.593571	1.080893	1.968307	8097.207	0.821	-0.00067

Source: Authors own calculations

Distributed Lag Models used in the Study

Model	GDPt = α0+ α1GDPt-1+ α2IMPt					
Country	α0	α1	α2	R2	F>F	
Southern Africa	503724.3 (1.04)	1.061 (11.66)	-2.176 (0.095)	0.978	181.58>2.16E-07	
Mozambique	225937.6 (0.266)	1.112 (6.61)	-150.28 (0.361)	0.978	184.39>2.03E-07	
Zambia	270017.9 (0.441)	1.105 (9.88)	-114.39 (0.515)	0.979	187.52>1.9E-07	
Zimbabwe	409459.1 (0.932)	1.094 (15.74)	-1669.73 (0.88)	0.980	199.44>1.49E-07	
Angola	501213.8 (1.12)	1.074 16.49)	-7.942 (0.54)	0.979	188.172>1.88E-07	

Source: author's own calculations

Model	GDPt = α0+ α1GDPt-1+ α2EXPt					
Country	α0	α1	α2	R2	F>F	
Southern Africa	481979.6 (1.06)	1.045 (11.19)	3.93 (0.126)	0.978	181.73>2.15E-07	

Mozambique	563786.3	1.028	25.975	0.978	184.56>2.03E-07	

	(1.14)	(0.371)	(11.53)			
Zambia	545127.3 (1.14)	1.027 (0.35)	133.17 (10.74)	0.978	184.33>2.03E-07	
Zimbabwe	556045.6 (1.107)	1.028 (0.306)	201.71 (10.121)	0.978	183.53>2.07E-07	
Angola	389503.6 (0.721)	1.052 (0.322)	53.75 (18.94)	0.978	183.77>2.06E-07	

Source: author's own calculations

Model	EXPt = α0+ α1EXPt-1+ α2GDPt					
Country	α0	α1	α2	R2	F>F	
Southern Africa	3674.45 (0.82)	0.713 (2.25)	0.00035 (0.37)	0.780	14.23>0.0023	
Mozambique	-1354.86 (0.430)	0.389 (0.932)	0.00052 (1.003)	0.662	7.86>0.012	
Zambia	64.32 (0.13)	0.692 (2.03)	4.4E-05 (0.51)	0.783	14.49>0.0021	
Zimbabwe	-110.38 (0.214)	0.415 (0.619)	6E-05 (0.582)	0.719	10.23>0.006	
Angola	1449.40 (1.97)	0.821 (2.62)	-0.00012 (1.17)	0.475	3.624>0.075	

Source: author's own calculations

Model	IMPt = α0+ α1IMPt-1+ α2GDPt

Country	α0	α1	α2	R2	F>F	

Southern Africa	6895.89 (1.21)	0.633 (2.41)	0.00075 (0.689)	0.775	13.84>0.0025	
Mozambique	-803.37 (1.29)	0.765 (2.04)	0.00015 (1.47)	0.909	40.36>6.61E-05	
Zambia	-896.84 (1.159)	0.968 (2.29)	0.00016 (1.27)	0.833	20.048>0.00076	
Zimbabwe	-45.045 (0.48)	0.031 (0.05)	2.08E-05 (2.02)	0.371	2.366>0.155	
Angola	11636.77 (1.80)	0.957 (4.49)	-0.0010 (1.09)	0.793	15.33>0.0018	

Source: author's own calculations