Repositioning India's Cotton Lint Export Direction

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Abstract: *Following the recent non-impressive performance in the export volume of its cotton lint which in turn affected its foreign exchange earnings from the sector due to bear raid by USA and China price subsidies which caused imperfection in the global trade market, the researchers conceptualized the need to identify the magnitude and effects of the key drivers of India's cotton lint exports using Engel-Granger two-step procedure. The study used dated data spanning from 1981 to 2013 which were sourced from FAO and UNCTAD databases. The results of the long-run and short-run models showed that India's cotton lint export is stimulated mostly by the internal economic forces. However, export growth of the product was hindered by both the domestic and external forces. In this regard, in as much as the negative impact on India's cotton lint due to distortion induced downward pressure on world prices caused by price subsidies offered by China and USA, inefficiencies and constraints in the domestic environment would preclude India from appropriately exploiting opportunities and adjusting to unexpected market developments in the short-run. Therefore, to revitaliz the gloomy export trade of India's cotton lint, policy makers and various stakeholders in the industry should put in place measures to address domestic inefficiencies over which the country has some control compared to inefficiencies on the global market, thus placing the country in a better position to exploit market opportunities and adjust to unexpected developments in the shortest possible time.*

Key Words: *Reposition; Export; Cotton Lint; India.*

Introduction

Determinants of agricultural export in developing countries after trade liberalization are still a controversial issue in economics (Kinghu, 2014). Literature review showed that some studies in developing countries found internal determinants to be the driving force behind export while other studies found external forces to be the significant determinant of agricultural export. Therefore, the studies on the determinants of agricultural export in developing countries are marred with mixed results.

Baffes (2004) as cited by Anwar *et al*. (2010b) reported that the demand for cotton is increasing with population growth over the globe. This silver fiber has involved millions of India's rural households in its production. Currently, India is the second largest producer, consumer and exporter of cotton with world share production, consumption and exportation been 22 percent, 19 percent and 20.62 percent respectively (ITC, 2013). These respective periodical contributions reflect a strong reliance of India's economy on cotton lint exports, which consequently makes the country vulnerable to unexpected developments on the global cotton lint market.

The cotton sector, both in production and export dimensions has been subjected to various developments and instruments in internal and external policy environments over the past decades. In as much as internal efforts are aimed towards strengthening the sector, external influences in the form of distortions (production and export subsidies levied by major players - USA and China) have primarily induced downward pressure on world cotton prices and consequently prices faced by exporters, traders and producers in India. Changes in these policy environments, alongside pulls from other biophysical, structural, financial constraints have affected the export performance of India's cotton economy. These conditions place not only the current national production and export position at risk, but could as well trigger major food insecurity and poverty implications due to heavy reliance of majority of the India's rural populace on the cotton sector.

Research Methodology

The present research used dated data spanning from 1981 to 2013 sourced from the databases of FAO and UNCTAD. The data collected covered the internal and external macroeconomic indicators. The data analysis was

performed using the Augmented Dickey-Fuller unit root test (ADF), Engel-Granger two-step procedure model and the Granger causality test. Presented below are the empirical models:

Augmented Dickey-Fuller Test

Following Blay *et al.* (2015); Singh, *et al.* (2016); and, Sadiq *et al.* (2016) the Augmented Dickey-Fuller test (ADF) used is given below:

$$\Delta P_t = \alpha + P_{t-1} + \sum_{j=2}^{it} \beta_i \Delta P_{it-j+t} + \varepsilon \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where, P_{it} is the i^{th} variable at the tin t, ΔP_{it} $(P_{it} - P_{t-1})$ and α is the intercept or trend term.

Engel-Granger Two-step Procedure Model

Long-run Dynamic Model

$$CEXQ_t = \beta_0 + \beta_1 FDIF_t + \beta_2 FDIS_t + \beta_3 DI_t + \beta_4 TOT_t + \beta_5 CPQ_{t-1} + \beta_6 CI_t + \beta_7 WEV_t + \beta_8 MD_t + \beta_9 TOP_t + \beta_{10} WPR_t + \beta_{11} CGDP_t + \beta_{12} BGDP_t + \beta_{13} AI_t + \beta_{14} IND_t + \beta_{15} RWPP_t + \beta_{17} PRP_t + \beta_{18} IRP_t + \beta_{19} INF_t + \beta_{20} RER_t + \beta_{21} CMI_t + \beta_{22} CEXQ_{t-1} + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Short-run Dynamic Model

$$\Delta CEXQ_t = \beta_0 + \beta_1 \Delta FDIF_t + \beta_2 \Delta FDIS_t + \beta_3 \Delta DI_t + \beta_4 \Delta TOT_t + \beta_5 \Delta CPQt_{-1} + \beta_6 \Delta CIt + \beta_7 \Delta WEVt + \beta_8 \Delta MDt + \beta_9 \Delta TOP_t + \beta_{10} \Delta WPRt + \beta_{11} \Delta CGDPt + \beta_{12} \Delta BGDPt + \beta_{13} \Delta APt + \beta_{14} \Delta INDt + \beta_{15} \Delta RWPPt + \beta_{17} \Delta PPRt + \beta_{18} \Delta IRPt + \beta_{19} \Delta INFt + \beta_{20} \Delta RERt + \beta_{21} \Delta CMI_t + \beta_{22} \Delta CEXQ_{t-1} + ECT_{t-1} \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where, CEXQ is the Export quantity of cotton; FDIF is Foreign direct investment (flow); FDIS is Foreign direct investment (stock); DI is Diversification index; TOT is Term of trade; CPQ is the cotton production quantity; CI is Concentration index; WEV is World export cotton volume; MD is Market potential of domestic cotton lint or world market demand of cotton lint; TOP is the Trade Openness; WPR is World price; CGDP is

China GDP, BGDP is Bangladesh GDP; AP is Agricultural productivity; IND is Industrialization; RWPP is ratio of real world to real domestic price of cotton lint; PPR is Pakistan's real producer price (neighbouring country); IRP is India's real producer price; INF is Inflation; RER is Real exchange rate; CMI is Competitiveness index; ε_i is the error term; *t* is the current time; t-1 is one year lagged period; β_0 is the intercept; β_{1-n} are the parameter estimates; and, Δ is the first difference operator.

Trade Openness: The Trade openness index is calculated as follow:

$$\boldsymbol{TOP} = {}^{(\boldsymbol{EX_{AG}} + \boldsymbol{IM_{AG}})}/_{\boldsymbol{GDP_{AG}}} \times \mathbf{100} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Where, TOP is trade openness; EX is export; IM is import; AG is agricultural goods; and GDP is the nominal Gross domestic product of the chosen country

Market Potential for Domestic Cotton Lint (MD): Following Anwar *et al.* (2010a and b) as adopted by Bashir (2003), the world demand or export market potential for domestic cotton measured in terms of weighted-average index of world export price for cotton lint is specified below:

$$\boldsymbol{MD_{CX}} = \propto \boldsymbol{WP_{CX}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Where, MD is market potential for domestic cotton lint; $\propto$ is share of cotton lint in country's total agricultural export; WP is constant price index for world export of cotton lint; and, CX is cotton lint export.

Competitiveness: Following Anwar *et al.*(2010a and b) the index of competitiveness as developed by Balassa (1965) which was measured through the ratio of country's export of cotton lint in its relevant sector at national level and then at world level is shown below:

$$\boldsymbol{CMI_{CX}} = \frac{\boldsymbol{X_{ij}} \ /\sum \boldsymbol{X_{ij}}}{\boldsymbol{X_{iw}} \ /\sum \boldsymbol{X_{iw}}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Where, CMI_{CX} is competitiveness index of India's cotton lint; X_{ij} is export of India's cotton lint; $\sum X_{ij}$ is total export of India's cotton sector; X_{iw} is export of world cotton lint; $\sum_{X_{iw}}$ is total export of world cotton sector. The numerator represents the commodity structure of the exports from India and the denominator represents the product structure of the global market.

Concentration Index: The index was constructed to depict the extent of expansion in marketing of cotton lint in the total India's exports and specified below is the formula:

$$CI = \sqrt{sum\left[\frac{X_{ij}}{\sum X_{ij}}\right]^2} \quad \text{..... (7)}$$

Where, CI is concentration index; X_{ij} is export of India's cotton lint; and, is $\sum X_{ij}$ total export of India's cotton sector.

Diversification Index: Literature has shown various methods used to measure level of diversification but for the present empirical examination, Berry's index was used and the model is given below:

$$BID = 1 - \sum_{i=1}^{n} P_{it}^2 \quad \text{..... (8)}$$

$$P_{it} = \frac{A_{it}}{\sum_{i=1}^{n} A_{it}} \quad \text{..... (9)}$$

Where, BID is Berry's Index of Diversification; P_{it} is share contribution of i^{th} sub-sector to the main sector at time t; A_{it} is i^{th} export value of ith sub-sector at time t; and, t; and, $\sum_{i=1}^{n} A_{it}$ export value of cotton sector at time t.

Inflation: Using the following formula the consumer price index (CPI) was used to calculate inflation:

$$INF = {}^{(CPI_t \quad CPI_{t\ 1})}/_{CPI_{t\ 1}} \times 100 \quad \text{..... (10)}$$

Where, INF is inflation; CPI is consumer price index; *t* is current period; and, *t-1* is lagged period.

Real Prices: Real prices are prices that have been adjusted for inflation in order to hold the value of currency constant, and allow comparison of the exchange value of a good or service at different time periods. Unlike nominal prices, real prices are not observed in the market, and they are calculated. Below is the formula used to calculate real price:

$$\boldsymbol{RP_t = (CPI_{t\ 1} | CPI_t) \times NP_t} \quad \text{..... (11)}$$

Where, RP is real price and NP is nominal price.

Real exchange rate: Following Yousif (2015) as adopted by Kingu (2014), the real exchange rate is calculated as follow:

$$\boldsymbol{RER_t = (CPI_{India} | CPI_{USA}) \times NER_t} \text{ .} \quad \text{..... (12)}$$

Where, RER is real exchange rate; CPI is the consumer price index at time *t*; and, NER is nominal exchange rate in the local currency.

Granger Causality Test

Following Granger (1969) the model used to check whether market $\boldsymbol{P}_1$ Granger causes market $\boldsymbol{P}_2$ or vice-versa is given below:

$$P_t = \alpha + \sum_{i=1}^{n} (\emptyset P_{1t-i} + \delta_i P_{2t-i}) + \varepsilon_i \quad \text{..... (13)}$$

A simple test of the joint significance of δ_i was used to check the Granger causality i.e.

$$H_0 : = \delta_1 = \delta_2 = \ldots\ldots\ldots \delta_n = 0.$$

Results and Discussion

Unit Root Test

The results of ADF unit test applied at level showed all the variable series to be non-stationary as indicated by the tau-statistics which were not different from zero at 5% degree of freedom. Further, application of the ADF unit root test at first difference showed all the variable series to be stationary as

evident from their respective tau-statistics which were different from zero at 5% risk level. Furthermore, the linear combination of these variables or macroeconomic indicators was integrated of an order one less the original order of the variables [I(0)]. In other words, the application of ADF unit root test at level to the co-integrating regression residual showed the variable series to be stationary as indicated by the tau-statistic which is lower than the Engel-Granger critical value at 5% probability level (Table 1). Thus, it can be inferred that the macroeconomic indicators move together in the long-run as they shared the same or one stochastic trend, and the results of the linear combination is reliable for long-run prediction as the regression results of long-run model is not spurious. Also, there is absence of spurious correlation as evident from the coefficient of multiple determination which is not too close to unity i.e. not too large or over inflated.

The Engel-Granger co-integration approach was followed in examining the existence of long-run equilibrium relationship among the macroeconomic predictors. For the Engel-Granger two-step procedure, the required two conditions were met. The variables were integrated of order one [I(1)], and the residual from the co-integrating relationship was integrated of order zero [I(0)].

Table 1: Stationarity Test

Items	Stage	ADF		Decision
		tau-stat	t-critical at 5%	
CEXQ	**Level**	-1.57522	0.4833	Non-stationary I(0)
	$\mathbf{1}^{st}$	-5.68659**	6.54E-07	Stationary I(1)
FDIF	**Level**	-0.82450	0.7984	Non-stationary I(0)
	$\mathbf{1}^{st}$	-7.14717**	1.31E-010	Stationary I(1)
FDIS	**Level**	-0.21676	0.934	Non-stationary I(0)
	$\mathbf{1}^{st}$	-3.08436**	0.03825	Stationary I(1)
DI	**Level**	-1.03784	0.2634	Non-stationary I(0)
	$\mathbf{1}^{st}$	-6.04127**	9.52E-08	Stationary I(1)
TOT	**Level**	-2.09823	0.2455	Non-stationary I(0)
	$\mathbf{1}^{st}$	-7.77297**	2.98E-07	Stationary I(1)
CPQ	**Level**	-0.20353	0.9282	Non-stationary I(0)
	$\mathbf{1}^{st}$	-5.38351**	3.14E-06	Stationary I(1)
CI	**Level**	-3.43684	0.0642	Non-stationary I(0)
	$\mathbf{1}^{st}$	-5.44663**	2.18E-05	Stationary I(1)
WEV	**Level**	-1.03226	0.7295	Non-stationary I(0)
	$\mathbf{1}^{st}$	-6.90437**	2.12E-06	Stationary I(1)
MD	**Level**	-2.39192	0.1518	Non-stationary I(0)
	$\mathbf{1}^{st}$	-5.54606**	7.13E-05	Stationary I(1)
TOP	**Level**	-3.12959	0.1168	Non-stationary I(0)
	$\mathbf{1}^{st}$	-5.86309**	0.0001971	Stationary I(1)
WPR	**Level**	-2.83229	0.06503	Non-stationary I(0)
	$\mathbf{1}^{st}$	-5.72727**	5.27E-07	Stationary I(1)
CGDP	**Level**	-1.58586	0.7762	Non-stationary I(0)
	$\mathbf{1}^{st}$	-5.60418**	9.80E-06	Stationary I(1)
BGDP	**Level**	-0.72244	0.9626	Non-stationary I(0)
	$\mathbf{1}^{st}$	-4.95195**	0.0019	Stationary I(1)
AI	**Level**	-0.40216	0.9066	Non-stationary I(0)
	$\mathbf{1}^{st}$	-7.14849**	1.18E-06	Stationary I(1)
IND	**Level**	-0.99111	0.7586	Non-stationary I(0)
	$\mathbf{1}^{st}$	-2.90234**	0.04506	Stationary I(1)
RWPP	**Level**	-3.58492	0.09281	Non-stationary I(0)
	$\mathbf{1}^{st}$	-5.46787**	0.00211	Stationary I(1)
PRP	**Level**	-2.78590	0.07154	Non-stationary I(0)
	$\mathbf{1}^{st}$	-5.36476**	3.45E-06	Stationary I(1)
IRP	**Level**	-2.84220	0.06371	Non-stationary I(0)
	$\mathbf{1}^{st}$	-4.83118**	0.00049	Stationary I(1)
INF	**Level**	-3.19726	0.1029	Non-stationary I(0)
	$\mathbf{1}^{st}$	-5.71502**	5.49E-06	Stationary I(1)
RER	**Level**	-1.27465	0.6436	Non-stationary I(0)
	$\mathbf{1}^{st}$	-3.47884**	0.01552	Stationary I(1)
CMI	**Level**	-3.79289	0.0801	Non-stationary I(0)
	$\mathbf{1}^{st}$	-5.40914**	0.00017	Stationary I(1)
ECT	**Level**	-5.65898**	-3.34	Stationary I(0)

Note: ** indicate that unit root at level or 1st difference was rejected at 5% significant level

Impact and Effect of Macroeconomic Indicators on India's Cotton Lint Export

A cursory review of the results showed almost all the macroeconomic indicators to have impacts and effects on India's cotton lint export during the studied period. Macroeconomic variables *viz.* foreign direct stock investment (FDSI), terms of trade (TOT), world export cotton volume (WEV), China GDP (CGDP), Agricultural productivity (AP), Industrialization (IND), ratio of real world price to real producer's price (RWPP), India's producer price (IPR) and inflation (INF) had positive impacts and effects on the current India's cotton export while foreign direct flow investment (FDFI), diversification (DI), market potential of domestic cotton lint (MD), real exchange rate (RER) and lagged export quantity of cotton lint ($CEXQ_{t-1}$) had negative impacts and effects on the export performance of India's cotton lint in the global market. In addition, it was observed that China GDP (CGDP) and Bangladesh GDP (BGDP) had positive impact and effect respectively on export volume, while trade openness (TOP) exerted negative effect on the export growth of India's cotton lint (Table 2a).

The negative coefficient of the intercept coefficient for the cotton lint export in both the long-run and short-run model indicated that inspite of the gloomy nature of cotton lint export in the global market, India does not strongly rely on export of cotton lint. This is so, because the value of cotton lint is however expected to plummet significantly since all other things been equal. Besides the distortions in the world export trade of cotton lint due to subsidies offered by USA and China, the negative coefficients of the intercept for both the long and short-run models implied that India's cotton lint traders and exporters faced other domestic constraints that hinder them from appropriately responding to sudden developments in the export trade of cotton lint. By this, it is perceived that growth of the cotton lint export sub-sector of the country is hindered by both internal constraints and external forces.

The significant positive coefficient observed for FDSI in both the long-run and short-run implied that foreign direct investment of stock capital supplemented the limited resources of the cotton farmers in expanding their farms and boosting or increasing annual cotton lint output for export. In addition, the FDSI aided in enhancing industrialization of the cotton sector of the country as there is large demand for India processed textile in the global market. This investment may not contribute to the export growth of cotton

lint as the investment motive is to capture the domestic market. Therefore, the semi-elasticity implication of a percent increase in FDSI in the long-run and short-run will increase India's cotton lint export by 3.4% and 3.72% respectively. However, the FDSI effect is higher than its impact on India's cotton lint export

The significance of direct elasticity of TOT for both the models implied that favourable or positive terms of trade for India enhanced its performance in the exportation of cotton lint to the global market. In other words, India is observed to have quite an elastic response to improvements in the country's terms of trade index for exports in the long-run. In the long-run were India stands adjusting to short-run constraints, a percent increase in the TOT index in both the long-run and short-run would lead to 5.15% and 5.28% increase in the India's cotton lint export at times. Increase in trade openness would present the country with diverse and greater market opportunities and at the same time promotes efficiency in operations by exposing India to competition.

India's cotton lint volume was observed to rise with increased WEV, AP and IND in both the long-run and short-run. World trade in this contest reflects increased export volume triggered by increased demand as against over-production and subsidy induced increases. Increasing world demand for cotton lint triggers a competition among exporters from all parts of the globe, and such competition aids in restructuring and shaping economies that depend on the commodity for sustenance. Countries with a competitive edge-advantage would be able to respond and benefit from such demands. Therefore, it can be inferred that India has a competitive edge-advantage in cotton lint exports, and current domestic and international market inefficiencies should be addressed, the country stands a good chance in benefiting from increasing global demand for cotton lint. The semi-elasticity implication of a percent increase in WEV would increase its impact and effect on cotton lint export by 6.16% and 4.8% respectively.

Reflecting on Agricultural productivity index, it can be inferred that agricultural productivity stimulated growth in the exportation of India's cotton lint as it showed success of agricultural sector of the country. The marginal implication of a percent increase in the AP index would increase cotton lint export in the long-run and short-run by 4.47% and 4.06%. Reflecting on Industrialization (IND), it implies effective and efficient intra-industry trade, and export manufactured goods of India's cotton lint (ceteris paribus) move intensively to more industrialized countries. Therefore, a percent increase in IND index will increase its impact and effect on cotton lint export by 2.34% and 1.99% respectively.

The significant positive coefficients observed for India's real producer price (IRP) for both the long-run and short-run models implied that favourable producer price encouraged Indian's cotton producers to sell most of their products to the domestic licensed buyers or agents as against smuggling them into neighboring countries with higher prices in the black market. In addition, increases in real producer price of cotton helps the Indian's cotton farmers to invest appropriately in their farms hoping for better and sustainable outputs in the coming years. Therefore, an increase in the real producer price of cotton affects cropping decisions, as well as farmers' decisions to sell domestically or to smuggle. This shows that real producer price is a crucial factor in the supply decision of Indian's cotton farmers, and setting it too low may have negative effect on export of India's cotton lint. The semi-elasticity implication of a unit increase in the IRP will increase export volume of India's cotton lint in the long and short-runs by 6.1% and 4.3% respectively.

More interestingly, it was observed that the inverse coefficient of producer price of cotton lint in neighbouring Pakistan is not significant, indicating non-effectiveness of price disparity which will create incentive for smuggling of India's cotton lint. Thus, price of cotton lint in neighboring Pakistan did not affect export volume of India's cotton lint during the studied period.

The positive elastic coefficients observed for Inflation in both the long-run and short-run showed that demand-push inflation encouraged producers to increase production of cotton lint which inturn expand or boost export output to the global market. The marginal implication of a percent increase in the inflation rate will lead to an increase in the export volume of India's cotton lint by 3.70% and 2.22% in the long and short-runs respectively.

The significant positive long-run elasticity of China GDP proxy as foreign income which is relatively high and elastic revealed that growth and improvements in the economic condition of China boost cotton lint export of India. This conforms to *a priori* reasoning, which suggests that demand and income have a positive relationship. In addition, high income elasticity is evidence of adaptation of the export to local preference for cotton lint in China. Therefore, the marginal implication of a percent increase in CGDP will induce an increase in India's cotton lint by 2.39%. In other words, demand for India's cotton lint increase as China GDP increases. This outcome is not surprising as China which is the world number one largest producer

of cotton lint need more quantum of cotton lint to satisfy its industrial demand due to inability of its local supply to bridge the gap. China is by far the largest importer of cotton lint as a result of its production been lower than its consumption and also because it had started a stockpiling or inventory holding campaign aimed at shoring up domestic prices, combined with an increase of import quotas.

Also, the observed positive significant coefficient for Bangladesh GDP in the short-run proxy by income elasticity implied that economic growth in the economy of Bangladesh induced increase in the volume of India's cotton lint. The high value and elastic state of the coefficient of Bangladesh income elasticity is evidence of adaptation of the export to the local preference for India's cotton lint by domestic industries in Bangladesh. However, the cotton sub-sector of India witnessed an impact and effect with respect to China income elasticity and Bangladesh income elasticity respectively. The magnitudes of both income elasticities in the long-run and short-run were greater than 1.0, potentially revealing that the volume of the cotton lint traded is sensitive to the exporting country (India) production capacity or individual productivity of labour. This sensitivity of India's cotton lint export may be attributed to their efficient production capacity or less interference of government support in the domestic industry.

The significant positive impact and effect observed for the real world price to real domestic price showed that in as much as exporters would export more in times of increases in this ratio due to rising profit in export trade, any negative reaction on the part of the producers in times of an increase in the ratio will be insignificant due to high dependence of most of the producers on the crop for sustenance, and in-kind benefit farmers receive through government assistance and bonuses from buyers. The semi-elasticity implication of a percent increase in the RWPP in the long-run and short-run would increase export volume of India's cotton lint by 6.40% and 4.57% respectively.

The significant positive coefficient reflected by lagged production volume of India's cotton lint implied that increased production and stock for the previous year helped in bridging deficit in the current year's output to ensure sufficient quantities of cotton lint in the domestic market for both export in raw form and for domestic processing. Lagged instead of current production was used because of the strategy adopted by most exporters in the pursuit of maximizing

their profits. Increase in output in times of declining world price prompts most exporters to adopt inventory holding of some portion of cotton lint to take advantage of potential price increases later in the season or in the subsequent year. Exports therefore, respond more appropriately to lag outputs than they do to current outputs. Higher levels of production in time *t* at a favorable world price in time *t* would still lead to increase in stock in the domestic market to help minimize the adverse effects of adding-up in the global market which results in world price decline. In contrast to a close economy where production incremental is deemed bad due to the price-plummeting implications thereof, in an open economy, production incremental is regarded as an opportunity for export boost. The semi-elasticity implication of a percent increase in the CPQ_{t-1} would increase India's cotton lint export volume by 2.03% in the short-run. The insignificant of the CPQ_{t-1} in the long-run may be attributed to the exporters' anticipation of market imperfection correction in the global cotton market caused by the subsidies offered by the major exporting economies (China and USA).

Both long-run and short-run export volume of India's cotton lint were observed to respond negatively to an increase in direct foreign investment flow (DFIF), Diversification (DI), market potential of domestic cotton lint (MD), real exchange rate (RER) and lagged export volume of India's cotton lint ($CEXQ_{t-1}$). A reflection of the DFIF indicated that the investment was made with an export-oriented motive due to the comparative advantage of the recipient country and not with the motive of capturing the domestic market, thus, contributing to the export growth of India's cotton lint. The semi-elasticity implication of a percent increase in the DFIF in the long-run and short-run would decrease the export volume of India's cotton lint by 0.444% and 0.435% respectively. The reflection of DI in the long-run and short-run showed that India's cotton sector is receding towards specialization in the exportation of cotton lint as it accounted for the major share of foreign exchange earned from the sector. This outcome is expected as India has been a front-runner in the textile sector globally, been one of the largest industries in terms of its contribution in India's worldwide export. Also, the textile industry which is a sub of cotton lint sector is a key area where India has an opportunity for success on a global scale, given its abundant cheap labour since it is a labour intensive industry. Without doubt, the textile industry's predominant presence in the Indian's economy manifested in its significant contribution to industrial production, employment creation and foreign exchange earnings. The marginal implication of a percent increase

in DI for the long and short-runs will affect domestic production which in turn would decrease export volume of India's cotton lint by 0.36% and 0.47% respectively. However, its negative effect on export would be more than the impact as observed from a cursory review of the results.

The reflection of the world demand for cotton lint (MD) in the long-run and short-run indicated that increased demand for domestic cotton lint in the global market decreased export of cotton lint due to supply constraint. Increase in demand for domestic cotton in the global market, can decrease export of cotton lint if the supply side factors negatively responded. Thus, supply constraint to meet the world demand lead to decline in cotton lint export of India. Therefore, it can be inferred that the real constraint to export growth of India's cotton lint is not the export demand but rather the supply side of export. This finding is contrary to the findings of Anwar *et al.* (2010) who reported that export demand is not a constraint to export performance of Pakistan's cotton lint. Therefore, the semi-elasticity of a percent increase in MD in both the long-run and short-run would decrease export performance of India's cotton lint by 6.17% and 4.51% respectively.

The reflection of the lagged export volume (CEQ_{t-1}) both in the long-run and short-run models showed how glut due to price subsidy offered by China and USA caused market imperfection in the global cotton lint market thereby affecting export performance of India's cotton lint as the exporters adopt inventory holding strategy to take advantage of any slight potential price rise or arbitrage that may occurred in the future date to maximize profit. The elasticity implication of a percent increase in the CEQ_{t-1} in the long-run and short-run would decrease export volume of India's cotton lint by 4.22% and 4.06% respectively.

Contrary to *a priori* expectation, real exchange rate (RER) both in the long-run and short-run negatively affected export supply of India's cotton lint. The inverse relationship of real exchange rate with the export volume of India's cotton lint showed that currency devaluation which is expected to make export cheap and boost India export share in the global market plummet export performance and growth of India's cotton lint. This scenario can be attributed to the fact that India's cotton lint price is higher than that of USA and China which benefit from price subsidy thereby affecting export performance and world share export of India's cotton lint. Therefore, it can be inferred that devaluation of India rupee against US dollar did not favour growth of India's cotton lint due to market imperfection, thus, affecting the domestic economy of India as the country did not maximize foreign exchange

earning benefits from its cotton lint trade in the global market. In lieu of this, the anticipation is that exporters should take necessary actions to reduce or eliminate the negative effect of exchange rate movements on their output which is the profit determinant in most cases. Actions such as price, non-price or a combination of both can be employed depending on the competitive strength or market power of India. The marginal implication of a percent increase in the RER both in the long-run and short-run would decrease export volume of India's cotton lint by 4.22% and 4.06% respectively.

The negative elasticity of the trade openness (TOP) in the short-run implied that India's cotton is not integrated into the global market despite been the second largest producer and exporter of the product in the world. This outcome is not surprising as the price of cotton lint in the international cotton trade market is permeated by bear raid caused by subsidy offered by China and USA who accounted for the bulk of the world production and exportation. In addendum, China is the largest importer of cotton lint in the world as its domestic supply cannot satisfied there industrial demand. Since the export performance is affected by TOP, there is need for India to devise a protective measure to protect its domestic cotton subsector in order not to affect its home grown economy and not to expose it to external factors which will be detrimental to the vibrant industrial sector of the country. Therefore, the marginal implication of a percent increase in the TOP would decrease export volume of India's cotton lint by 5.28%.

The non-significant of the concentration index (CI) means that high domestic consumption of cotton lint did not have any effect on export volume of India's cotton lint. Also, the non-significant positive response of the export volume of India's cotton lint to the competitiveness index (CMI) revealed poor comparative advantage of India's cotton lint in the global market due mainly to market imperfection caused by price subsidy offered by the major cotton lint cartels (China and USA) in the world.

The insignificant of the world cotton price showed how international merchants take advantage of the asymmetric information on both sides, such when they buy cotton lint from the Indian ginners and when they resell it to the Asian importing spinners. This is because they have more information than the sellers (ginners) on the market, and have also more information than the buyers (spinners) on India's cotton production. By contrast, independent ginners have little knowledge of the world cotton market, and usually receive very little market information through merchants. As lint is sold free on truck

or free on board to international merchants, ginners are ignorant about the actual selling price of their lint as well as intermediary costs. Therefore, the cotton marketing system may send biased signals to ginners and producers. Moreover, as India's cotton is marketed almost exclusively through intermediaries, there is no direct feedback loop on buyer requirements from spinning mills and back to ginning companies and producers. Therefore, Indian producers and ginners receive feedback that has been "filtered" by merchants according to their own interests; complaints about the poor quality of shipments and positive feedback are most of the time concealed.

The result showed that the export volume of India's cotton lint established an efficient degree of integration with the external and internal factors as indicated by the attractor coefficient which is different from zero at 10% probability level, and had the *a priori* expectation sign which showed the convergence of the system towards the equilibrium. This implied that the export volume of India's cotton lint established a long-run equilibrium with the macroeconomic parameters and tends to correct the economy previous disequilibrium from the equilibrium at the speed of 135% over a year after the disturbance or shock. In other words, a shock that induce deviation of export from the equilibrium level would induce the exporters to respond to the shock in a way that export volume would converge toward its equilibrium value. The approximate time period required to adjust the shocks and changes needed to bring back the economy or for the economy to re-establish equilibrium is 4 years. The relatively low rate of adjustment of export volume indicates that India has good control over the export volume of its cotton lint.

Appropriate diagnostic tests performed confirmed that the short-run model is valid, as the residual is devoid of auto-correlation, auto-covariance, no covariance among the predictor variables, normality in the distribution of the residuals and the estimated coefficients are stable as indicated by their respective test statistics which were not different from zero at 10% degree of freedom (Table 2b). The estimated F-statistics in both the long-run and short-run models were different from zero at 10% degree of freedom, implying that the estimated parameters captured in the models were different from zero and are reliable for prediction. The estimated coefficient of multiple determinations in both the models showed that 94.56% and 93.45% of the variation in the export volume of India's cotton lint in the long-run and short-run respectively were determined by the internal and external economic forces captured in the models.

Table 2a: Long-run and Short-run Predictions for Cotton EXPQ

Variable	Long-run dynamic model (LNEXQ)			Short-run dynamic model (LNEXQ)			
	Coefficient	SE	t-ratio	Coefficient	SE	t-ratio	VIF
Constant	511.30	157.130	3.254***	0.03244	0.22914	0.142^{NS}	-
$lnCEXQ_{t-1}$	0.36731	0.151765	2.420**	0.23377	0.08116	2.880**	4.465
$lnFDIF_t$	0.44421	0.150710	2.947**	0.43523	0.11925	3.650***	3.542
$lnFDIS_t$	3.40988	0.889673	3.833***	3.72795	0.47096	7.916***	1.909
$lnDI_t$	0.35804	0.158441	2.260**	0.46513	0.10673	4.358***	3.735
$lnTOT_t$	5.14961	2.56909	2.004*	5.28257	1.18629	4.453***	3.121
$lnCPQ_{t-1}$	1.24026	1.46879	0.844^{NS}	2.02487	0.60883	3.326***	5.055
$lnCI_t$	2.29608	2.02112	1.136^{NS}	2.23700	1.40405	1.593^{NS}	1.615
$lnWEV_t$	6.16088	2.71966	2.265**	4.81144	1.29673	3.710***	6.386
$lnMD_t$	6.17295	1.94556	3.173***	4.50651	1.61377	2.793**	6.063
$lnTOP_t$	3.81585	3.20968	1.189^{NS}	3.83436	1.92115	1.996*	3.397
$lnWPR_t$	2.11471	2.34157	0.903^{NS}	0.81401	1.41412	0.576^{NS}	3.636
$lnCGDP_t$	2.39592	0.96497	2.483**	0.46025	1.11374	0.413^{NS}	4.691
$lnBGDP_t$	1.27498	3.73676	0.341^{NS}	3.56633	1.33287	2.676**	3.274
$lnAI_t$	4.46528	1.95212	2.287**	4.06108	7.17983	5.656***	2.765
$lnIND_t$	2.34421	7.28098	3.220***	1.99957	3.37241	5.929***	2.067
$lnRWPP_t$	6.40055	1.98211	3.229***	4.56673	1.63190	2.798**	3.042
$lnPRP_t$	1.85509	2.49874	0.742^{NS}	0.19937	1.24896	0.159^{NS}	3.948
$lnIRP_t$	6.04948	1.86089	3.251***	4.26160	1.58633	2.686**	3.296
$lnINF_t$	3.70003	1.10543	3.347***	2.22194	1.11793	1.988*	4.737
$lnRER_t$	4.22077	1.54539	2.731**	4.05832	1.20565	3.366***	3.095
$lnCMI_t$	1.66601	2.67131	0.624^{NS}	0.386303	1.79079	0.022^{NS}	7.333
ECT_{t-1}	-			1.35101	0.09144	14.77***	1.559
R^2	0.9457			0.93447			
R^2adjusted	0.8316			0.75426			
D-Watson	0.9137						
F-statistic	283.8(3.2E-11)***			519.3(2.4E-10)***			

Note: *** ** * NS means significant at 1%, 5%, 10% probability levels and non-significant respectively

( ): The value in parenthesis is probability level; VIF means variance inflation factors and values > 10.0 may indicate a collinearity (multicollinearity) problem.

Table 2b: Diagnostic Test for Short-run Model

Diagnostic item	Test	t-statistic
Heteroskedasticity	Breusch-Pagan test (LM)	$16.082(0.811)^{NS}$
Normality	Chi-square	$3.047(0.217)^{NS}$
Autoccorelation	LMF	$0.836(0.384)^{NS}$
	Ljung-Box Q	$1.040(0.308)^{NS}$
ARCH effect	LM	$1.659(0.197)^{NS}$
CUSUM (Stability test)	Harvey-Collier t	$-0.523(0.613)^{NS}$

Causal Linkage between India's Cotton Lint Export with Macroeconomic Indicators

Examining the long-run relationship of the lagged India's cotton lint export volume with the macroeconomic indicators, a perusal of the Table showed the existence of bidirectional causalities between the pairs of CEXQ-RWPP and CEXQ-IRP; unidirectional causalities between the pairs of CEXQ-TOP, CEXQ-PRP and CEXQ-CMI; and non-causalities between the pairs of CEXQ-DFIF, CEXQ-DFIS, CEXQ-DI, CEXQ-TOT, CEXQ-CPQ_{t-1}, CEXQ-CI, CEXQ-WEV, CEXQ-MD, CEXQ-WP, CEXQ-CGDP, CEXQ-BGDP, CEXQ-AP, CEXQ-IND, CEXQ-INF and CEXQ-RER (Table 3). For the bidirectional causality it implies that the former granger cause the latter and the latter granger cause the former. The implication of the unidirectional causality means that only lagged information of the former contain reliable information to predict the future direction of the latter. However, for the non-causality it implies that neither the former nor the latter contains useful information to predict the future direction of each other. Therefore, it can be inferred that strong endogenity, weak exogenity and strong exogenity existed in the case of bidirectional, unidirectional and none causalities respectively. The Wald test signified the weak role of export volume of India's cotton lint in the global cotton market. This result is not surprising as the India's cotton lint price is on the high side when compared to that of China and USA which are low due to administrative price offer.

Table 3: Granger Causality Test Results

Null hypothesis	F-stat	P < 0.05	Granger cause	Direction
$CEXQ \leftrightarrow FDIF$	0.3587	0.5563	No	None
	0.9171	0.3503	No	
$CEXQ \leftrightarrow FDIS$	0.0684	0.7964	No	None
	0.3121	0.5829	No	
$CEXQ \leftrightarrow DI$	1.3495	0.2598	No	None
	0.1547	0.6984	No	
$CEXQ \leftrightarrow TOT$	2.7490	0.1137	No	None
	3.4442	0.0791	No	
$CEXQ \leftrightarrow CPQ$	1.0605	0.3160	No	None
	0.0593	0.8102	No	
$CEXQ \leftrightarrow CI$	0.2286	0.6380	No	None
	1.3804	0.2545	No	
$CEXQ \leftrightarrow WEV$	0.4967	0.4895	No	None
	0.4354	0.5173	No	
$CEXQ \leftrightarrow MD$	0.7237	0.4055	No	None
	2.1635	0.1577	No	
$CEXQ \leftrightarrow TOP$	9.3550**	0.0065	Yes	Unidirectional
	0.3813	0.5442	No	
$CEXQ \leftrightarrow WPR$	1.8982	0.1843	No	None
	0.0670	0.7985	No	
$CEXQ \leftrightarrow CGDP$	1.2934	0.2703	No	None
	0.9243	0.3491	No	
$CEXQ \leftrightarrow BGDP$	2.4855	0.1323	No	None
	1.0094	0.3284	No	
$CEXQ \leftrightarrow AI$	0.0167	0.8985	No	None
	0.7731	0.3908	No	
$CEXQ \leftrightarrow IND$	2.1694	0.1581	No	None
	0.9035	0.3544	No	
$CEXQ \leftrightarrow RWPP$	10.140**	0.0051	Yes	Bidirectional
	16.651**	0.0007	Yes	
$CEXQ \leftrightarrow PRP$	22.282	0.0002	Yes	Unidirectional
	2.0025	0.1741	No	
$CEXQ \leftrightarrow IRP$	4.6819**	0.0442	Yes	Bidirectional
	5.0622**	0.0372	Yes	
$CEXQ \leftrightarrow INF$	3.0333	0.0986	No	None
	0.5677	0.4609	No	
$CEXQ \leftrightarrow RER$	0.1549	0.6985	No	None
	0.3142	0.5820	No	
$CEXQ \leftrightarrow CMI$	7.9577**	0.0113	Yes	Unidirectional
	2.6712	0.1195	No	

Note: ** denotes rejection of the H_0 at 5% level of significance
$\rightarrow \leftarrow$ *means forward and backward directions respectively*

Conclusion and Recommendations

Findings showed that the cotton sector of India is not integrated into global market due to subsidized cotton lint price offered by two major exporting economies (China and USA), thereby affecting the export share of India in the global cotton market. In addition, the effect of the cotton price subsidy affected the growth of India's cotton lint export as devaluation of the local currency did not make export cheaper nor increase its share export in the international market. Furthermore, the cotton market system conveyed biased world price signals filtered by the international merchants who capitalized on the asymmetric information on both the supply (ginners) and demand (spinners) sides in the market, thus affecting the export performance of India's cotton lint. Therefore, the study recommended adoption of prompt actions such as price, non-price or a combination of both depending on the competitive strength or market power of the exporting economies to enhance the growth and performance of India's cotton lint export in the international market. In addition, India should continue with its protective measures to protect the agricultural and industrial sectors from external shocks created by the major cotton exporting economies. Advisably, India should devise measures of production cost-cut in order to make the cotton economy competitive in the global market as the country have abundant and cheap human resource which can be used to harness this potential capital intensive sector.

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