

## **Bilateral Trade through Official Channel between India and Bangladesh: An Analysis with the Use of Time Series Forecasting Models**

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Bilateral trade between India and Bangladesh will be mutually beneficial to both the countries and improve welfare as per trade theory. This study has tried to forecast impact of trade between two countries considering the time period 1991-2014. The researchers compared Autoregressive Moving Average (ARMA) and Autoregressive Integrated Moving Average Model (ARIMA) after testing the significance of Augmented Dicky fuller model's intercept of explanatory variables. While using ARIMA model the study found that best-fit estimates were exports to India. However, forecasting indicates that import from India to Bangladesh also had a positive impact over the time period 1991-2014. By engaging in bilateral trade with India, Bangladeshi producers and suppliers ought to be concerned about attaining long term sustainability in their business, by improving quality of the products so that export can be raised in a competitive manner. Market access to India will be beneficial only with having competitive advantage, in bilateral trade. To export products, India should allow duty free access to certain products from Bangladesh in which it has competitive advantage. To maintain Pareto optimality in the bilateral trade, Bangladesh should import products from India at competitive prices. This will help to promote and nurture bilateral trade relations, ensure sustainability of business and mutually benefit both the countries through free trade agreement.

### **1. Introduction**

Trade between India and Bangladesh has a long history. Besides bilateral trade with India, informal trade also plays an important role in Bangladesh. Trade between these two countries is not only creating value but acting as a value chain, which is a corner stone for improving

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bilateral relationships. However, given the geographical proximity, relationship with India is historical, cultural, social and cordial to have any significant impact on the two economies. Therefore increasing bilateral trade between the two neighbouring countries is very essential for employment generation, economic development and growth. Furthermore, according to Ankit(2015) India's foreign policy would appear to the Commonwealth Relations Office to be 'a picture not only of an ever enlarging sphere of regional co-operation but also of expanding Indian ambitions' is somewhat not valid in this century .Both the countries should maintain diplomatic relationship not only for geopolitical reasons to mutually benefit from each other to ensure sustainable economic development and growth through South Asian Association of Preferential Trade Agreements (SAPTA)and the Bay of Bengal initiative for Multi-Sectorial Technical and Economic Cooperation (BIMSTEC),but also to fight against global and regional terrorism, irradiate poverty, and improve welfare for millions. There are three factors that are identified in case of Bangladesh, which have a negative influence for encouraging trade: ease of doing business, unrecorded informal trade and high transaction cost of engaging in trade.

(1) *Ease of Doing Business*: 'Ease of Doing Business Index (EDBI) for Bangladesh in 2014 was last measured at 173 and for India 142 out of 189 countries [see World Bank, (2014)]. As such Bangladesh still has a long way to go for further development of easing business procedure, which is to provide business friendly environment in this competitive global state of the 21<sup>st</sup> century. Likewise India should also reduce its protectionist trade policies between the South Asian nations. (2) *Informal Trade*: World Bank (2015) stated that since the independence in December 1971, there has been a substantial increase in informal unrecorded trade across the India-Bangladesh land borders, and a number of studies both in Bangladesh and in India have dealt with different aspects of it. (3) *Transaction Cost*: The trade diverted through the formal channels provide customs revenue, and this would be higher if administrative and other reforms reduce the scope for corrupt practices. Better infrastructure, faster clearance times and reduced transaction costs would also improve the prospects of Bangladesh exporters finding niche market in India, especially if they rely on importing inputs from India, where there is two way border crossing for trade [see World Bank (2015)].

Key factors that unite Bangladesh and India as identified by Government of India (2013) are the following:

- Both the countries share a common heritage- language, civilisation, colonial history, social and, economic history.
- India and Bangladesh have common interest and share a common heritage for music, classical dance, literature, poetry and the creative arts.
- With Bangladesh, India shares not only a common history of struggle for freedom and liberation but also enduring feelings of both fraternal as well as family ties.
- India played a major role in emergence of Independent Bangladesh during the 1971 war, and it was also the first country to recognize Bangladesh as a separate independent nation.
- There have been major issues such as illegal migration, border, water sharing disputes, Moore Island, which have had a negative impact on bilateral trade in the recent years.

Ahmed(2015) argued that the Indian Prime Minister Narendra Modi visited Bangladesh in June, 2015 for a mere 36 hours, but left an impact, big enough to wipe away mistrust that had crept in the Indo-Bangladesh relationship over the decades. The Indian Express (2015) quoting Joshi, President of the Federation of Industry and Commerce, North-Eastern Region of India commented that the agreement during Modi's visit to Bangladesh was on infrastructure development, which focuses on connectivity by road, rail, air, river, sea, transmission lines, petroleum pipelines and digital links. This development will have a multiplier effect on the economy and provide a real boost to cross-border trade between Bangladesh and North Easternpart of India. Sharma (2015) reported that an investment of US\$ 2 billion line of credit is extended to Bangladesh, further to current US\$ 1 billion. Most importantly, if boundary disputes are settled then the foundation to build trust for infrastructure development is laid. This will be mutually beneficial for trade between the two countries. During the visit most of the 22 bilateral agreements were signed aimed at boosting trade and transport links. Further, Indian corporate entities like Reliance Power and Ambani Group signed agreements to invest around \$5 billion which will help Bangladesh to generate extra 4600 MW of power, to meet its electricity demand.

Main objective as neighbouring countries should be to try to resolve all cross-border disputes peacefully, without forgetting the 1971 war of independence and soldiers who sacrificed their life from both sides for independence, in order to mutually benefit from trade relationships and maintain peace and harmony across border for economic development and growth. According to sources of ministry of external affairs, there has been progress in Indo-Bangladesh relations as per the following initiatives taken by the government on both sides:

- High level of recent contacts at government level, exchange and visits.
- Wide ranging people-to-people interaction at cultural and social networking level.
- Indian High commission in Bangladesh issues about half a million visas every year and thousands of Bangladeshi students study in India on self-financing basis.
- Recipients of over one hundred annual Government of India scholarships.
- Bangladesh Prime Minister Sheikh Hasina in 2011, along with Indian Prime Minister Dr. M. Singh announced the commencement of 24-hour access across the Tin Bigha corridor to Dahagram and Angorpota enclaves, as well as duty-free import of 46 textile items (subsequently expanded to all items, except 25 items) from Bangladesh to India.
- Common vision for rural development, health, education, clean drinking water and sanitation, people's empowerment and economic development issues discussed at the government level.
- India has always helped Bangladesh in its hour of need with aid worth over Taka 250 crore (over US \$ 37 million) to help it cope with natural disasters and floods in 2007-08.
- Supply of 1,000 MT of skimmed milk powder, and 40,000 Million Tons of rice.
- India completed and handed over 2,649 core shelters in the affected villages in Bagerhat district in southern Bangladesh.
- Line of Credit Agreement was signed in Dhaka on August 7, 2010 between EXIM Bank of India and Government of Bangladesh. India has extended a line of credit of US\$1 billion to Bangladesh for a range of infrastructure and development projects, including railway infrastructure, supply of BG

locomotives and passenger coaches, procurement of buses, and dredging projects.

- January 29 -2012, NTPC and BPDB set up a Joint Venture for the establishment of a 1320-MW coal-based power plant in Bagerhat district, Khulna at an estimated cost of \$1.5 billion and is to be commissioned by 2016.
- India offers 100 places under ITEC and 35 under Technical Cooperation Scheme of Colombo Plan every year to Bangladesh. In the last three years (2006-07 to 2009-10), 414 participants from Bangladesh underwent training in India under ITEC Programme and Technical Cooperation Scheme of Colombo Plan. Government of India gave Muktiyoddha Scholarship to 200 Higher Secondary-level students and 478 Graduate-level students. Further, in 2011 three Bangladesh Diplomats were also imparted training at Foreign Service Institute in India.

Such bilateral Cultural Exchange Programme (CEP) 2009-2012 between Bangladesh and India provides the platform for fruitful exchanges; given the shared history and commonality of language; cultural exchanges form an important bond of friendship between the people of two countries. Special emphasis has been laid on promotion of cultural exchanges in the fields of music, theatre, art, sports, painting and books, such as: Joint celebrations of 150th anniversary of Rabindranath Tagore; to honour the Indian friends of Bangladesh for their contribution to the 1971 Liberation War; through student-teacher exchange programmes and reciprocal programmes of cooperation; promote people to people exchanges, 100 scholarships are being granted by ICCR every year to students from Bangladesh, and; In the year 2013-14, total export from Bangladesh to India was worth US\$ 457 Million, while total import from India to Bangladesh was worth US\$ 5514 Million and total trade with India was US\$ 5971 Million.

**Picture 1:** Geographical location of Bangladesh in South Asia



Source: Google Map

According to Bammi (2010), India being geographically close to Bangladesh and a larger country is an important partner from trade and economic point of view, given the benefit of ease of travel, similar culture, language and transportation between the two countries as seen from Picture-1. Sutherland (2012) argued that indeed the 21<sup>st</sup> century rush to promote bilateral trade agreements has been accompanied by a rise of protectionism. Srinivasan and Vani (2009) argued that keeping in mind that one cannot infer welfare effects directly from the trade creation and trade diversion effects of preferential trade; they interpret their results from the coefficient estimates from their gravity model of export, import and total trade flows as broadly indicating that the pursuit of preferential trade agreements is counterproductive. They concluded that India's superior policy option continues to be unilateral and multilateral trade liberalization.

The research question for this study is to investigate whether it is possible to have an optimal formal trade arrangement between the two neighbouring countries India and Bangladesh? This is elaborated below based on preliminary analysis of the data. Asteriou and Hall (2007)

argued that ARMA models can only be made on time series  $Y_t$  that are stationary. Time series is not constant over time, which means that the series are non-stationary. If, after first differencing, a series is stationary, then the series is also called integrated to order one, and denoted  $I(1)$  – which completes the abbreviation ARIMA. This paper is structured as follows. Following the introduction, section two provides literature review. Section three provides methodology followed by section four which discusses the results of empirical analysis. Section five provides conclusions, implications and future research directions.

## **2. Literature Review**

Krugman (1980) rightly asserts that if two countries have the same composition of demand, the larger country will be a net exporter of the products whose production involves economies of scale. Bangladesh capacity to attain competitiveness in trade with India is a big question, due to low capacity building, as well as lack of competitiveness in the formal trade and huge balance of trade deficit. Wangwe (1993) elements of the new trade theories which are relevant to trade and development issues pertaining to developing countries can be applied to India and Bangladesh: the conception of process of narrowing the technology gap between the developed and developing countries; implications on the conception of North-South technology-related negotiations; the role of multinational activities in the developing countries; intra-south trade and investments; industrial dynamics and attainment of competitiveness; and the role of government policy in enhancing competitiveness in the economy. Ethier (2001) described that countries tend to trade a lot with their neighbours, so it is sometimes said that current regional initiatives between the two countries, often involving neighbours, are therefore likely to be benign. Hassan (2002), emphasised that the geographical proximity of India along with the increasing familiarity of Bangladesh's importers to India's production capacities, which in recent years have become globally competitive both in terms of price as well as quality has made Indian products increasingly competitive in Bangladesh's market. He suggested that the only way to increase the volume of intra-regional trade and reduce the trade deficit with India, Bangladesh should take the following steps: devalue its currency, seek reduction in tariff and non-tariff barriers on exports to India, stop cross-border smuggling activities, eliminate structural and political rigidities and conflicts, encourage more Indian investment into Bangladesh and make the

SAPTA more meaningful, effective and operational tool to reap the benefits from integration.

Moreover there are positive benefits to the countries and the world, by engaging in regional, bi-lateral and multi-lateral free trade [see Khan (1999), Dutta (1999), and Jain (1999)]. However, intra-SAARC trade is very small (Hassan, Mehanna and Bashir 2001) compared to other regional blocks like ASEAN and NAFTA. Further, Hassan (2001) empirical study, using the gravity model of international trade for years 1996-1997, concluded that the proportion of intra-regional trade between the South Asian block of countries is very small due to “normal outcomes or unexplored opportunity” (p.264), and if increased, can have significant welfare improving benefits along with implementing supporting policies by the governments to encourage preferential trade agreement under South Asian Association of Regional Cooperation (SAARC). Hassan (2001) results supports the argument that small countries depend more on trade than larger and diversified countries; poor countries trade less with each other, than with the rich countries, and countries sharing common border, trade more with each other.

Therefore regional economic cooperation between these two countries should be encouraged, given the similar social-economic and cultural conditions. The major export items from a small country Bangladesh, to a comparatively large country India within the SAARC region as recorded by Dhaka Chamber of Commerce are the following: Woven Garments; Knitwear; Home Textile; Agri-Products; Frozen Food; Leather & Leather Products; Footwear; Raw Jute; Jute Goods; Bicycle  
*Major Import Items to Bangladesh from India* are: Cotton (all types), cotton yarn / thread and cotton fabrics; Cereals; Vehicles other than railway or tramway rolling- stock and parts and accessories thereof; Residues and waste from the food industries, prepared animal fodder; Nuclear reactor, boilers, machinery and mechanical appliances parts; Iron and steel; Edible vegetables and certain roots and tubers; Organic chemicals ;Mineral fuels, mineral oils and products of their distillation, bituminous substances, mineral waxes; Plastics and articles thereof; Tanning or dyeing extracts, tannins and their derivatives, dyes, pigments and other colouring matter, paints and varnishes, putty and other mastics, inks; Salt, sulphur, earths and stone, plastering materials, lime and cement [see Dhaka Chamber of Commerce (2015)].



Further items exported by Bangladesh are: Electrical machinery and equipment and parts thereof, sound recorders and reproducers, television image and sound recorders and producers and parts and accessories of such articles; Man-made staple fibers; Dairy produce, birds' eggs natural honey, edible products of animal origin, not elsewhere specified or included; Coffee, tea, mate and spices; Rubber and articles thereof ; Edible fruit and nuts, peel of citrus fruit or melons; Man-made filaments; strip and the link of man-made textile materials ;Aluminium and articles thereof; Knitted or crocheted fabrics; Inorganic chemicals, organic or inorganic compounds of precious metal, of rare earth metals, of radioactive elements for isotopes; Paper and paper board, articles of paper pulp; Essential oils and resinoids; perfumery, cosmetic or toilet preparation; Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruits; industrial or medicinal plants; straw and fodder and Pharmaceutical products [see Dhaka Chamber of Commerce (2015)]. However, the largest trading partners of Bangladesh are European Union and North America in terms of legal exports and India for legal imports since late 1990's [see Hassan (2001)].

World Bank also reported in the year 2002 surveys that smuggled goods were imported from India to Bangladesh during 2002/03 were worth approximately \$500 million, or about 40% of recorded imports from India, and approximately 30% of total imports (recorded plus smuggled) from India[see World Bank, (2006)].Pohit and Taneja (2003) argued that informal trade continues to thrive because the transacting environment of formal and informal trading arrangements gives rise to lower transaction costs in the informal channel. Srinivasan (2002) depicted that unless the transacting environment improves significantly for formal traders, informal trade will continue to co-exist along with formal trade.

Hossain and Rashid (1999) argued from their empirical study, that Bangladesh's trade with India is neither fair nor competitive due to trade barriers .Bhagwati (1995) described that the restrictiveness of trade barriers is therefore likely to have increased as required. Such elasticity and also selectivity are in fact characteristics of the "administered" protections embodied in antidumping actions and Voluntary Exports Restraints (VERs) which make them both a preferred instrument of protection by industry and also a serious barrier to free trade. Further, the transacting environment of formal trade agreement between India

and Bangladesh indicates that the inefficiencies of the trade regimes give rise to rent seeking activities by the authorities, bureaucrats and politicians. That is formal traders prefer to use mechanisms of informal trading to settle disputes[see Pohit and Taneja (2003)].

Ahmed (2006) very rightly pointed out that firstly, Bangladesh-India relationship is faced with certain puzzles which need to be addressed professionally and without any animosity. Secondly, the regional and global scenarios have transformed the Indo-Bangladesh relationship in several key areas, both for the good and the bad, therefore, not fully realising the benefits of bilateral trade between neighbours who have significant historical advantage. Khan and Khan (2003) suggest to have open regionalism, that is outward oriented development policies by merging regional trading blocs and harmonising domestic economic policies with global economic policies, and extend the SAARC integration to West Asia in Iran, to Burma in the East, to benefit from trade, investment opportunities and develop economic links with the world to improve on its socio-economic indicators.

Bhuyan (2006) observed that the root cause of Bangladesh's trade imbalance with India is the country's narrow production base in both exports and import substitutes. The country's industrial sector being in a rudimentary stage of development, cannot meet the growing demand of the domestic market. The result is the country's acute dependence on imported supplies to meet domestic demand. Export production in Bangladesh is also narrowly based and not diversified. Most of the products that Bangladesh may exports to India are already produced by India for domestic consumption and exports. Further, protectionist trade policies of India prevent imports of few products from Bangladesh, which are believed to have comparative advantage. World Bank (2006) study noted that Bangladesh perennial large bilateral trade deficit with India might be a cause for concern, but it has not led to any balance of payments problem for Bangladesh mainly because of regular trade surpluses with trading partners as US and EU which compensates for these deficits with India. The large volume of informal/illegal trade remains a problem though across the borders with Bangladesh. Sikdar, Mohnen and Chakraborty (2006), have suggested a Free Trade Area (FTA) option, and the governments of both these countries need to think about this seriously. Such a free trade arrangement is likely to go a long way towards deeper integration of the two South Asian countries, such

as freeing of trade in services, free flow of investment, trade facilitation, harmonization and mutual recognition of standards and coordination of macro-economic policies and solving other disputes related to border and resources. In particular, it will produce substantial benefits for the Bangladesh economy by improving its overall competitiveness through access to the marketing network, skill and technology of Indian manufacturers and trading partners. Pursell and Sattar (2006) also argued that informal trade between India and Bangladesh have consistently found a similar pattern, to the pattern of formal trade, which is large volumes of goods being smuggled from India to Bangladesh, but much smaller volumes being smuggled in the opposite direction. This generally concludes that there is also a substantial Indian trade surplus on informal account, which is confirmed by this study and is consistent with the findings in the literature.

Sikdar, Mohnen and Chakraborty (2006) described that Bangladesh's trade deficit with India has increased substantially since the start of this 21<sup>st</sup> century. This has given rise to concerns at the government policy level, as well as public perception of deteriorating relationships. Moreover, Basu and Datta (2007) noted that Bangladesh has export similarity with India and hence faces high export competitiveness. The lack of match between Bangladesh export and Indian import also generates a constraint of complementarity. Both the countries use different trade-related indices like RCA and Cosine measures to examine the extent of trade similarity and complementarity in inter-industry bilateral trade. The possibility of intra-industry trade between the two countries is also studied with the help of G-L indices. Export has been found to be of random nature and trade deficit has a perverse relation with exchange rate, driven by flow of foreign exchange remittances from abroad. They suggested that Bangladesh should pursue an appropriate exchange rate policy and aim at increased diversification in her export structure, in order to avoid Dutch disease and to reduce the bilateral trade deficit. The effect of falling exchange rate can be positive on one hand as it increases exports, but also it can increase trade deficit [Islam, Kham and Ishak (2013)].

De and Bhattacharyya (2007) advocated that India and Bangladesh need to minimize transaction costs arising due to trade by removing visible and invisible barriers to trade. Countries can tackle transaction costs only through improved and integrated trading infrastructure, which is

responsible for faster movement of goods and services across the countries. Dutta (2007) observed that Bangladesh has a large trade deficit with India which has been increasing on average at the rate of 9.5 per cent annually, along with large volumes of informal imports from India across the land border, to avoid Bangladesh import duties. Suranovic (2010) pointed out that the “competitive market” creates an incentive to satisfy consumer desires and demands. This is the ultimate goal of any economic system. The greater the competition between trade incentives, the greater will be the potential surplus generated out of the process. Thus, a competitive market promotes the incentives that result in greater economic efficiency.

Alam, Uddin, Alam and Malakar (2009) argued that the statistical result of Purchasing Power Parity (PPP) for Bangladesh with India and China shows that the price of foreign country (India or China) has no significant impacts on bilateral exchange rate and the price of home country (Bangladesh) has opposite behaviour that PPP warranted. Further, Rahman, Khan, Nabi and Paul (2010) opined that a number of initiatives could be taken to stimulate bilateral trade between the two countries. As the analysis has shown, abolition of sensitive list is likely to have only an insignificant adverse impact on the Indian economy; but also, mere duty-free-quota-free (DF-QF) market access to India is not likely to enhance Bangladesh’s export to India in any significant way. Under these circumstances India should be persuaded to provide duty-free market access for all exports originating from Bangladesh, and likewise Bangladesh should put renewed emphasis on diversification of her export basket in the Indian market, which is possible under SAPTA and BIMSTEC (alliance of South and South East Asian countries).

Islam (2011) commented that North-Eastern region of India bordering with Bangladesh, should be explored in a ‘creative fashion’ as Bangladesh enjoys certain locational and comparative advantages with regard to the North-Eastern part of India. On the other hand, closer economic integration and physical connectivity with Bangladesh would not just reduce the economic isolation of the region, but more importantly these would also reduce the isolation of North-East with the Indian mainland. This is what perhaps underlies in the India’s ‘Looking at East’ policy. The development of Indian North-East is inextricably linked with India’s political, economic, social and security issues with the bordering nations to the East. The development of the North Eastern

region would, serve India's strategic purpose. Both the nations should therefore, recognise the fact that Bangladesh's economic development is in India's interest and similarly India's development and prosperity of the North-East region, is in Bangladesh's interest.

Acharya and Marwaha (2012) recommended that to develop and build technological capacity, huge investments in research and development and innovation is required. Hence the signing of Bilateral Investment Promotion and Protection Agreement (BIPPA) between India and Bangladesh was the right step in this direction to encourage Indian investment into Bangladesh. Nevertheless, there are certain issues which need to be addressed for creating a favourable investment climate in Bangladesh: Developing single window clearance for new business proposals; setting an Industrial Park for India in Bangladesh outside EPZ with all the needed infrastructure facilities; upgrading the tax holiday system; and harmonizing HS Code System. Bhagwati and Srinivasan (2002) commented that it is difficult to agree with the many critics of free trade that see the heavy hand of such globalization casting its evil spell on the poorest of the poor countries. The empirical truth seems to be exactly the opposite, that is international trade is mutually beneficial.

De, Raihan and Kathuria (2012) described that countries like Bangladesh and India can benefit greatly from opportunities created for trade through economic cooperation. The scope for trade expansion between the two countries depends partly on their trade complementarities, which is relatively limited, but growing; partly on account of their economic imbalance. The other driver of bilateral trade is intra-industry trade between India and Bangladesh. This has the potential to grow significantly, since trade in similar product lines has been growing, and that could deepen production and supply chain networks between the two countries. Due to the infrastructural bottlenecks at the border is affecting India-Bangladesh bilateral trade. This is due to the following reasons as discussed by Acharya and Marwaha (2012):

- Inadequate traffic planning which causes congestion at the sea ports. Port congestion results in demurrage, which hikes the cost of production.

- Irregular and inadequate supply of electricity has forced many firms to rely on power from captive generators which further aggravates production costs.
- Lack of adequate infrastructure facilities at the Petropole Border where majority of the trade is routed through the Petropole (Indian side) - Benapole Border.
- The road - rail connectivity is poor and there is lack of alternative transport options.
- Limited air cargo and container service (especially from / to Benapole and Darshana)
- Inadequate and limited facilities at the existing Land Border Stations due to undeveloped infrastructure, causing delays in valuation and clearance at Land Customs Stations.
- Inadequate warehousing, cargo handling equipment, customs and immigration facilities, and means of communication at some of the road and rail based land ports on both sides. Bangladesh Land Port Authority (BLPA) has recently taken initiatives to develop the necessary infrastructures through the public-private partnership.

Rahman, Ahamad, Islam and Amin, (2012) suggested that Bangladesh's policymakers should give higher priority to increase domestic agricultural production and supply side capacities in items which have already demonstrated their export potential in the Indian market. In this regard, closer collaboration between research institutions of Bangladesh and India will enable Bangladesh to access and benefit from transfer of modern agricultural technology from India. Basher (2013) empirically found that Bangladesh's exports to India are highly responsive to changes in the competitiveness of the country as reflected in real exchange rate movements. Assuming *Ceteris Paribus*, a one percent increase in competitiveness is likely to increase Bangladesh's export to India by about 8 percent. A one percent increase of Indian GDP is found to be associated with 0.8 percent rise in exports from Bangladesh to India. Their findings indicate that improved competitiveness and economic growth are significant predictors for exports. While policy induced measures such as exchange rate management can be a difficult option, as enhanced external competitiveness can be achieved through tackling supply side hindrances.

Bhardwaj (2014) argued that FTA between Bangladesh and India has to be signed on a priority basis because the huge trade gap has always been a matter of concern between the two countries. Indian formal exports to Bangladesh amounted to about US\$4 billion (with an additional US\$4 billion of 'informal' exports), while Bangladesh's total exports to India was around US\$350 million. However, unless the para-tariff and non-tariff barriers are completely removed, the trade cooperation will be below its full potential level. Bown (2014) was concerned whether a multilateral system with fully enforceable, time-invariant, free trade would be possible or even desirable in the long run. Further, Razzaque and Basnett, (2014), argued that implementation of a comprehensive regional integration program as well as improved trade facilitation measures, effective transport infrastructure networks, ICT connectivity, and co-operation in such areas as services trade, investment and energy can unleash major avenues of trade for regional as well as global markets.

Rather and Gupta (2014) observed that the annual value of informal exports to Bangladesh from India in the year 2000 was estimated at between \$1 billion. Mostly popular consumer goods of international quality are also informally traded at the border areas between the two countries. It is quite obvious that informal trade between the two countries does not take place because of trade policy distortions. The informal traders usually engage in illegal trade to avoid the problems they face while transacting legal channels due to rent seeking behaviour and corruption. Therefore it is possible, that even in a zero duty regime some informal trade would persist between countries across borders. Rashid (2014) observed that although India has granted Bangladesh duty-free access to all items except tobacco and liquor, there exist reportedly several types of local duties which are around 15 per cent and this discourages exports from Bangladesh to India. Thus non-tariff measures are turned into non-tariff barriers while complying with sanitary and phyto-sanitary measures and technical barriers to trade.

Gaurav, Bharti and Sinha (2015) suggest that in the current context of ongoing trade negotiations between Bangladesh-Sri Lanka and Indo-Bangladesh bilateral FTA, it is advisable to reduce sensitive list of commodities. This is because it gives fresh impetus in terms of providing new technology, expansion of the international markets, and new opportunities for investment in both the countries. The local business

entrepreneurs in Bangladesh raise the fear of losing local industry and agro-activities, but Bangladesh may also realize the intra-SAARC trade, differently. Instead of trade competition, Bangladesh may look for intra-industry/intra-business compliments as is evident in the case of India-Sri Lanka Free Trade Agreement (ISFTA).

Apart from the purely economic factors, non-tariff barriers like delays at major trade routes, customs ‘harassment’, visa-related issues, rigid bureaucracy and infrastructural hurdles have ailed the trading relations between India and Bangladesh[see Mukherjee (2015)].Therefore from the literature review it can be concluded that there is a significant amount of unofficial/informal trade between the two countries, high transaction cost with absence of business friendly environment to engage in official trade, thus, resulting in trade imbalance between Bangladesh and India. As such, a research gap was identified and this research is undertaken to see the prospects of bilateral trade through official channel between two countries considering forecasting of trade between India and Bangladesh. The study has been undertaken with the following objectives:

- To assess the current bilateral trade situation between India and Bangladesh
- To examine an optimal trade arrangement between India and Bangladesh
- To provide forecasting about future trade between two countries.

### **3. Methodology**

Box-Jenkins methodology is applied in this paper. It requires a long time series generally covering at least 50 observations; the researchers could only use data for the last 25 years. There are two reasons for using this short span of data - first, information were not systematically available prior to 1990, and secondly, the researchers wanted to avoid structural break. The latest major structural break is noticeable in 1990 financial year (FY).The study ignores introduction of floating exchange rate in the year 2003 (May) due to two reasons: i) in our model we do not consider exchange rate as an independent variable; ii)exchange rate is yet to be fully determined by the market based mechanism in Bangladesh. Time period of the study is from 1990 to 2014.



### 3.1 Data Sources and Data Examination

Export and import data by commodities and by destinations are published quarterly by the Bangladesh Bank in its Quarterly Export Receipts and Quarterly Import Payments and by the Ministry of Finance through its Bangladesh Economic Review and Export Promotion Bureau. The researchers have collected all statistical data from the above mentioned sources. Correlation with Exchange Rate and Ratio of Trade between India and Total world (in %), Total (World) Trade with Bangladesh and Total (India) Trade will be determined.

However, depending on the dependent variable, time period will change. Therefore Augmented Dickey-Fuller test of unit root will be used to do further tests. Augmented Dickey-Fuller test will examine whether a unit root is present in an autoregressive model and whether there is autocorrelation in the residuals. Unit root tests will be used whether trending data can be first differenced or regressed on deterministic functions of time to cause to be the data stationary.

The researchers compared autoregressive moving average (ARMA) or Autoregressive Integrated Moving Average Model (ARIMA) after testing the significance of Augmented Dickey Fuller model's intercept of explanatory variables. ARMA model may be examined in the model as the study is working with time series data with fewer terms overall than either through an MA and / or an AR model by themselves. Autoregressive integrated moving average (ARIMA) model indicates stationary and non-stationary time series. The study will also see trend stationary and difference stationary. Stationary refers to mean, variance, and autocorrelation over the time period will be constant, to find best model-fit.

The best model-fit will be represented based on Box-Jenkins cycle of identification-estimation-diagnostic checking and forecasting. The study has taken natural logarithm of the variables. Depending on the data series (exports, imports and ration) the researchers proceeded to decide about ARMA or ARIMA equations of the model to follow an Autoregressive (AR) process and Moving Average (MA). AR model consists of lagged terms of the time series itself. Moving Average (MA) is a lagging indicator that cannot predict new trends, but can authenticate trends which is recognized. As such, even after using AR

terms, there can be serious correlation at various lags. Thereby, in the next step we will estimate the model with different AR and MA terms, keeping in view the properties of residuals like independence, homoscedasticity and normality. A general ARIMA model could be written as:

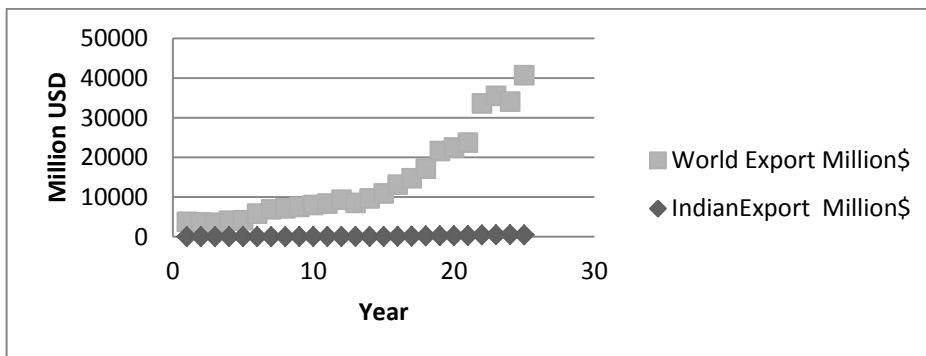
$$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \dots + \alpha_n Y_{t-n} + \beta_1 \varepsilon_{t-1} + \dots + \beta_m \varepsilon_{t-m} \dots \quad (1)$$

If white noise error term problem arises then in this model autoregressive filter, which is used in the long term and moving average filter which will be used in the short term. Integration filter refers to stochastic trend. Autoregressive models are important to assess stationary time series. Moving average models are appropriate for stationary time series. Depending on sign of autocorrelation, partial autocorrelation function (PACF) and autocorrelation function (ACF) will be determined. This study will also forecast errors and these errors will depict the quality of the forecasting model. For forecasting evaluation it is essential to first determine Root Mean Squared Error, Mean Absolute Error, and Mean Absolute Percent Error, Theil inequality coefficient which will be re-scaled by bias, variance and covariance.

### 3.2 Preliminary Analysis

Based on preliminary analysis of the data and tables below the research question for this study was identified. The research question for this study is to investigate whether it is possible to have an optimal formal trade arrangement between the two neighbouring countries India and Bangladesh? Figure-1 below illustrates the export from India to Bangladesh which is near zero.

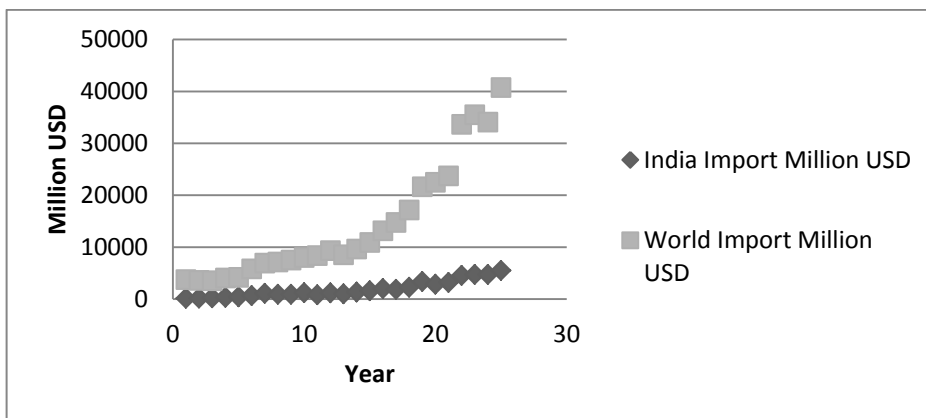
**Figure 1:** Export from India to Bangladesh and World Exports



(Source: Based on Authors' Data Analysis)

Figure-2, illustrates the import to India from Bangladesh which has been rising since the beginning of this century, however still far less than that of Rest of the World.

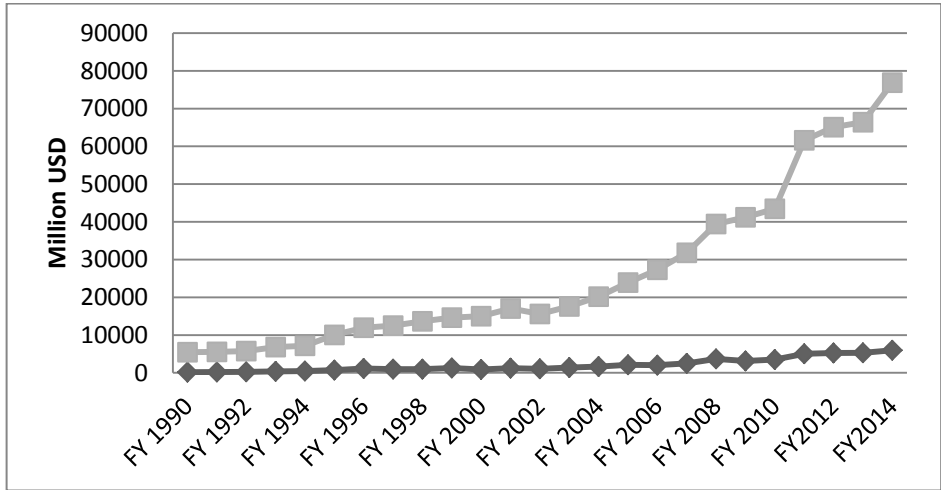
**Figure 2:** Import to India from Bangladesh and World



(Source: Based on Authors' Data Analysis)

Balance of trade position of world countries and India's with Bangladesh shows that, it is low compared with the Rest of the World, as shown in Figure-3.

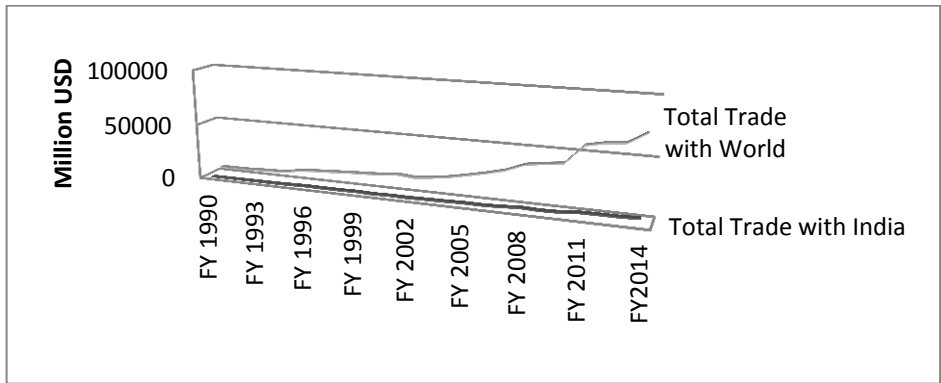
**Figure 3: Balance of Trade with India and World**



(Source: Based on Authors' Data Analysis)

Figure-4 illustrates the total trade of Bangladesh with the Rest of the World countries is significantly on the rise, mainly in the ready-made branded garment sector, whereas trade with India is growing very slowly, almost insignificant.

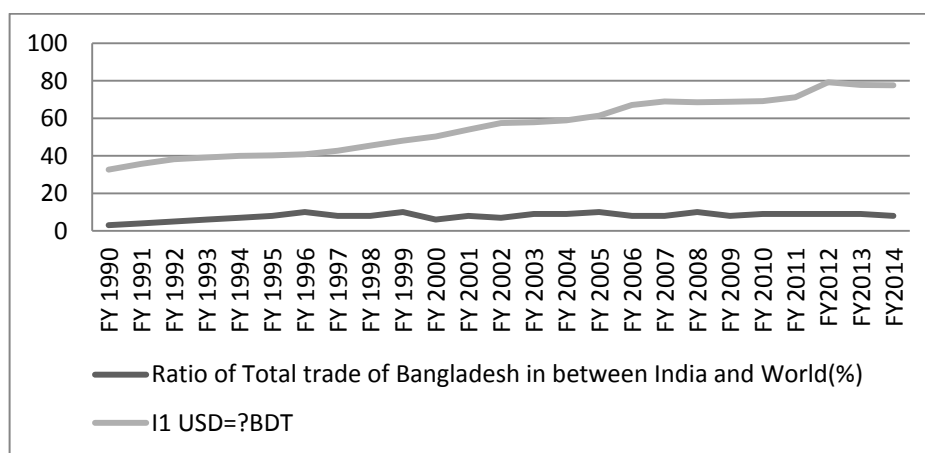
**Figure 4: Total Trade of Bangladesh with India and World**



(Source: Based on Authors' Data Analysis)

Ratio of trade between India and Total World, and its relationship with the exchange rate is illustrated in Figure-5, which shows that Bangladesh trade with India is growing slowly but far below the Total Trade with Rest of the World.

**Figure 5:** Ratio of Trade between India and Total World and Exchange rate



(Source: Based on Authors' Data Analysis)

Preliminary analysis suggest that if proper business friendly environment is provided for formal trade development, reduced transaction costs, along with transport infrastructure development, and no tariff and non-tariff barriers to trade then both the countries can engage in formal trade and mutually benefit from bilateral trade agreement within the SARRC region.

#### 4. Empirical Analysis

This section covers empirical results as discussed below:

##### 4.1 Pearson correlation results

- Pearson correlation result between Ratio of Trade between India and Total World (in %) and exchange rate is found as 0.580 which is significant at 1% level. This indicates that there are moderate positive correlation between ratio of trade between India and total world (in %) and exchange rate which implies

that one variables increase or decrease will have impact on other variables.

- Pearson correlation result between Total World Trade with Bangladesh and Exchange rate is found as 0.904 which is significant at 1% level of significance. This indicates that there is strong positive correlation between Total World Trade with Bangladesh and exchange rate, which implies that if one variable increases or decreases will have impact on another variable.
- Pearson correlation result between Total (India) Trade with Bangladesh and Exchange rate is found as 0.910 which is significant at 1% level of significance. This indicates that there is strong positive correlation between Total (India) Trade with Bangladesh and exchange rate which implies that one variables increase or decrease will have impact on another variable.

#### 4.2 Unitroot to determine stationarity

Augmented Dickey Fuller (ADF) test was applied to the data to check for stationarity and the results are place in Table 1 below. From Table-1 it can be seen that at level, both ‘export to India’ (LEXPORTIND) and ‘imports from India’ (LIMPORTIND), both in log terms did not pass the ADF test indicating that the variables are non-stationary. Nonetheless, ‘TRADE RATIO’ in logarithm passed the test at 5 percent level showing that it is stationary at level.

Results of Stationarity test are reported in Table-1 below:

**Table1:**Result of the regression equation of Augmented Dicky

Variable	Level(ADF with intercept)	First Difference	Type of Test
LEXPORTIND	4.348887	-3.172237**	ARIMA
LIMPORTIND	-1.486076	-5.409664 ***	ARIMA
LTRADE_RATIO	-3.714755**	-6.599574***	ARMA

\*\* 5% level\*\*\*1% level Source: Based on Authors’ Data Analysis

At first difference, both the variables could reject the null hypothesis of unit root at 5 percent and 1 percent level respectively. This means that the variables are stationary at first difference. Thereby, we may conclude that both exports to India and imports from India variables are integrated of order 1, i.e. I (1). From Table-1, we can observe that Augmented Dicky Fuller Model's intercept of LEXPRTIND and LIMPORTTIND is not significant. As such the study will test ARIMA model. But for the LTRADE -RATIO's Augmented Dicky Fuller Model's intercept is significant at 5% level for which we shall test ARMA model. In Table-1 the stationarity test indicates that first difference of export is negative but significant at 5% level. In case of import it is negative, but significant at 1% level. In case of trade ratio intercept is significant at 5% level, while first difference is significant at 1% level although the sign is negative. Of the several alternatives, the best estimate for exports and imports with India is reported in Table-2, showing the results of ARIMA Model- Exports to India. Further, details related to Table-2 are given in appendix as Table: 1.

**Table2:** Results of ARIMA Model: Exports to India Sample 1990-2014

LEXPRTIND	2312	+0.5148	+0.4849	+1.2820	+0.9032
=		AR(3)	AR(5)	MA(1)	MA(2)
t-statistics	0.001	2.63	2.15	11.24	10.74
Adjusted R2=		0.9353			F= 58.78

Source: Based on Authors' Data Analysis

Table-3, reports the results of ARIMA Model- Imports from India. It can be seen that all the t-test results were acceptable with high adjusted R2 and F-statistics. The forecasting power of the model is good. The predictive power of the model indicates that actual and predicted values have high level of close match. Detail of Table-3 is given in appendix as Table: 2.

**Table 3:** Results of ARIMA Model: Imports from India - Sample 1990-2014

LIMPORTI ND	13.6	+0.9814AR (1)	-0.9044MA (1)	+0.5165MA (2)	-0.5645MA (4)
t-statistics	0.72	18.11	-5.03	3.36	-6.72
Adjusted R2=	0.9508				F =97.57

Source: Based on Authors' Data Analysis

Table-4 below reports results of ARMA Model: Imports from India. From the above Table-4, it can be observed that the equation adjusted R2 is quite good and F statistics is acceptable, because as per ARMA model it indicates that export to India is good as the equation-2 indicates significant. But import and trade ratio indicates insignificant. Detail of Table-4 is given in appendix as Table: 3.

**Table 4:** Results of ARMA Model: Trade Ratio - Sample 1990-2014

LTRADE_RATIO	2.13	+0.4509AR (2)	-1.072MA (1)	-1.1294MA (2)	
t-statistics	42.3	10.88	-2.45	-2.49	
Adjusted R2=	0.7905			F =24.9	

Source: Based on Authors' Data Analysis

#### 4.4 Forecast Evaluation

Table-5 evaluates the forecast results on exports and imports with India. It reports the various measures of forecasting errors, viz., root mean squared, mean absolute error, mean absolute percentage error, and Theil coefficient.



**Table 5:** Forecast Evaluation

	<b>LEXPORTINDF</b>	<b>LIMPORTINDF</b>
Root Mean Squared Error	0.546811	0.204959
Mean Absolute Error	0.461016	0.171026
Mean Abs Percent Error	11.46903	2.505528
Theil Inequality Coefficient	0.057629	0.014459
Bias Proportion	0.710818	0.008751
Variance Proportion	0.045676	0.028413
Covariance proportion	0.243506	0.962836

Source: Based on Authors' Data Analysis

It may be noted that our forecast is limited and it could not be extended for out-of-sample, as number of the observation are made in only 14 years. From Table-5 it is discernible that the calculated value of RMSE is almost of the same magnitude as that of MAE. They can be equal if all errors are exactly the same. The smaller the reported errors, the better will be the forecasting ability of the model. The Theil coefficient is also less <1 one. It does not necessarily lead to acceptance of the model, but does indicate that it performs better than other models.

From Table-5, it can be observed that imports from Bangladesh will be relatively better if there is an increase in exports from Bangladesh to India. Root Mean Squared Error is a measure of standard deviation (SD). In case of exports SD is 0.546811 while for imports SD is 0.204959. Root Mean Squared Error for import is relatively better. Mean absolute percentage error (MAPE), is determining prediction accuracy of a forecasting method. As such MAPE for exports is 11.46903 while MAPE for imports is 2.505528. Therefore, imports have a better predictive accuracy. Theil inequality coefficient gives information about accuracy of forecasting method for exports to India, which will be 0.057629, while in case of imports it will be 0.014459. It indicates that imports from India are good for Bangladesh. Bias proportion which indicates systematic error of 0.710818 is observed for exports to India, while for imports is 0.008751.

Bias indicated systematic error and as for import value is close to zero so it is relatively better than export. In case of variance proportion, which pointed out the capability of the forecasts to replicate degree of variability in the variable to be forecast, we observed that for exports it is 0.045676 while for imports it is 0.028413. As the variance proportion of export is large then the import, so it means that actual series has fluctuated considerably, whereas the forecast has not. Covariance proportion which measures unsystematic error indicates that for exports it is 0.243506 while for imports it is 0.972836. Covariance of imports is higher than exports, so highest proportion of inequality is relatively good. An overall result from aforesaid forecasting evaluation differs from our previous findings in Table: 2, as Import is relatively better than export in Table:5.

## **5. Conclusions, Implications and Future Research Directions**

The study concludes that in the forecasting model, import is good for Bangladesh. Bangladesh being a small economy is less competitive than India, for which formal trade in terms of imports can create value chain between the two countries. This is due to the fact that while importing from the India being a neighbouring country, transportation costs are low. On the other hand as per the ARIMA model, best fit equation is exports to India. Bangladesh should put emphasis on exporting products to India as per their demand at a competitive price, as well as maintain high quality of the product. Suranovic (2010) comments on creating competitive market will lead to efficiency in bilateral trade for Bangladesh. However, until today, quality of goods exported from Bangladesh to India are not up to the standard and therefore, is not well equipped to compete in the Indian market. Further, Hassan (2001) asserts that the reason for Bangladesh's low intra-regional trade within the SAARC region is due to not producing goods that are demanded by the SAARC countries, low level of industrialisation and diversification of the industry. Hassan, Mehanna and Bashar (2001), also concluded from their study that within the framework of SAARC regional block, South Asian Preferential trade opportunities should be explored for economic cooperation, potential for trade liberalisation policies and concessions to reap the gains from mutually beneficial trade. However, due to the absence of complementarity in production, resource base, financial limitations, political tensions, there is low volume of intra-

regional trade which can be mutually beneficial to the SAARC or BIMSTEC countries.

If Bangladesh can export readymade high quality branded clothing to the western world, then the question is why the same quality is not maintained for exports to India. Excellence in maintaining first world quality and benchmarking for the standard of the products at international level by Bangladesh, with low cost, may create competitive advantage to sustain favourable bilateral trade position with India, which will ultimately narrow down balance of trade position. Further, Wangwe's (1993) view regarding the role of government policy in promoting competitiveness in the economy of Bangladesh, for creating competitiveness in the production process will assist to achieve favourable trade situation in the future. However, social and political stability, zero-tolerance to terrorism, and building trust between two nations especially at the political leadership level is extremely significant to manage mutual benefits from bi-lateral free trade agreement (FTA). Srinivasan (2002) suggestions should be considered by the policy makers so that efficiency and effectiveness as well as competitiveness in the bilateral trade through official channel should be improved, so that informal trade can be reduced. Trading through official channel should be free from bureaucratic delays and rent seeking behaviour.

Formal trade between Bangladesh and India is forecasted to be economically and mutually beneficial creating a win-win situation, if the least cost combination is used to produce products, efficient infrastructure and transportation system across border is provided, business friendly environment, avoiding bureaucratic delay, red tape and corruption is reduced, which can further ensure free trade and fair pricing along with "partnership and cooperation" [see Singh (2014)] for economic development. Krugman's (1980) view should be considered by the policy makers of Bangladesh as economies of scale can be attained in the production process. Withdrawal of protection in terms of trade barriers (tariff and non-tariff barriers) are not sufficient for Bangladesh unless and until Bangladesh can earn competitiveness in bilateral trade. Non-tariff measures are turned into non-tariff barriers by India, while complying with sanitary and phyto-sanitary measures and technical barriers to trade, which is not effective for enhancing trade.

To reach sustainability in the long run through bilateral trade with India, suppliers and manufacturer from Bangladesh ought to be concerned about promoting development of world quality products, engage in product differentiation, continuous innovation, attract new customers, reliability of supply, investing and nurturing a sustainable business enterprise through FTA. Indian foreign policy must also be business friendly, towards gradually improving the bilateral trade relationship which is supposed to be a combination of regional cooperation, as well as meet the needs of the Indian market as also indicated by Ankit (2015). Production intensity of Bangladesh in the industrial sector, both export oriented industries and import substitution industries should be raised. Thus, bilateral cooperation between the two countries will have positive impact on creating economic efficiency and effectiveness. If formal trade can be increased through efficient and effective services, including infrastructural development, reducing transaction cost as advocated by World Bank (2015), along with opportunities for cross-border electricity trading [see Chattopadhyay and Fernando (2011)] will not only result in rise in earnings from bilateral trade, but also meet the increase in demand for power. However, India should withdraw tariff and non-tariff barriers completely for SAPTA to work.

Given that Indian companies will have comparative advantage, mutually agreed protective mechanisms can be put in place the transitional period, for disadvantaged companies of Bangladesh. In the globalized regional economy, India should give Bangladeshi exporters duty free access to their market to a certain level, based on goods in demand. Innovative and dynamic product lines, with assuring quality control of products should be attained in Bangladesh in context of superior goods and diversified exportable commodities should be produced by the country to attain competitive advantage. Benchmarking of Bangladeshi product with global standard should be obtained, as well as cost reduction and establishing strategic alliances between both the country's business partners is required.

Bhagwati and Srinivasan (2002) advocated in their empirical findings that globalization process is helpful for poor country. FTA between the South Asian countries will be beneficial for which the platform of South Asian Association of Regional Cooperation (SAARC) can be used, but unfortunately it is not as successful as other regional trading agreements such as ASEAN and EU. SAARC's objective of economic cooperation

for promoting accelerated economic growth to improve the welfare and quality of life of the people in South Asia has not been met. It is just a cultural platform and not at all very effective in building trust and strong business relationships in South Asia or having fruitful trade negotiations under SAPTA. In order to build political, social, and economic ties to mutually benefit the SAARC as well as BIMSTEC region, it is essential to start first with building trust, disarm and focus on economic development, outward looking economic policies to attract foreign investment, improve institutions and promote growth through bilateral preferential trade agreements. It seems that for India and Bangladesh intra-regional trade is not as important, and they are more biased towards trading with Rest of the World.

Current study is conducted based on secondary sources of trade data for Bangladesh. For in-depth study, primary source can be used in future research as to look at the informal trade between Bangladesh and its bordering countries. Bilateral trade through official channel is beneficial for both the countries and there is a wide scope to increase volume of trade between the two countries through a collaborative approach, private partnerships and capitalising on the huge potential benefit from trade by providing business friendly environment, reduce informal trade (smuggling) and transaction costs of doing business. It is thus essential to build a sound foundation of trust, along with political wisdom to eliminate all political conflicts and issues at all levels, in order to build capacity, reap the benefits from economies of scale in trade flows, attract direct investment from India in human and physical capital, technology transfer, innovation and creation of economic efficiency, for which active cooperation, partnerships, and stability is required to revitalize and rejuvenate the relationship between the two countries in the 21<sup>st</sup> century.

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## APPENDIX

### Detail Regression Results

Below Table 1 reports the result of regression equation considering dependent variable log of export to India where we did ARIMA model:

**Table:1** Result of 1<sup>st</sup> Regression Equation on Export to India

Dependent Variable: LEXPORTIND

Method: Least Squares

Sample (adjusted): 1995 2014

Included observations: 20 after adjustments

Convergence achieved after 219 iterations

MA Backcast: 1993 1994

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2312.358	1647090.	0.001404	0.9989
AR(3)	0.514779	0.196091	2.625210	0.0222
AR(5)	0.484941	0.225852	2.147164	0.0529
MA(1)	1.281965	0.114039	11.24143	0.0000
MA(2)	0.903175	0.084096	10.73978	0.0000
R-squared	0.951447	Mean dependent var		4.434991
Adjusted R-squared	0.935263	S.D. dependent var		0.941622
S.E. of regression	0.239582	Akaike info criterion		0.220086
Sum squared resid	0.688794	Schwarz criterion		0.465149
Log likelihood	3.129265	Hannan-Quinn criter.		0.244446
F-statistic	58.78808	Durbin-Watson stat		1.239795
Prob(F-statistic)	0.000000			
Inverted AR Roots	1.00	.16+.74i	.16-.74i	-.66+.64i
		-.66-.64i		
Inverted MA Roots		-.64+.70i		

Source: Based on Authors' Data Analysis

From the above regression equation it can be noted that log of export from India is dependent variable. Sample period of the equation is for the period of 1995 to 2014. R square and adjusted R square indicates

that the equation fits well. Autoregressive -3 is significant at 5% level of significance. Autoregressive -5 is significant at 10% level of significance. Moving average (1) and moving average (2) indicates significance at 1% level of significance. Durbin Watson statistics indicates autocorrelation; F statistics is significant at 1% level of significance.

Below given Table - 2 reports the results of another regression equation considering dependent variable as log of import to India where we did ARIMA model:

**Table:2-** Result of Regression Equation on Import to India

Dependent Variable: LIMPORTIND

Method: Least Squares

Sample (adjusted): 1991 2014

Included observations: 24 after adjustments

Convergence achieved after 46 iterations

MA Backcast: 1987 1990

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	13.63823	18.75394	0.727219	0.4776
AR (1)	0.981427	0.054200	18.10737	0.0000
MA (1)	0.904408	0.179821	-5.029495	0.0001
MA (2)	0.516486	0.153668	3.361054	0.0040
MA (4)	0.564490	0.084048	-6.716257	0.0000
R-squared	0.960618	Mean dependent var		7.029149
Adjusted R-squared	0.950772	S.D. dependent var		0.869112
S.E. of regression	0.192833	Akaike info criter		-0.249727
Sum squared resid	0.594953	Schwarz criterion		-0.001032
Log likelihood	7.622137	Hannan-Quinn criter		-0.195754
F-statistic	97.56833	Durbin-Watson stat		1.700202
Prob (F-statistic)	0.000000			
Inverted AR Roots	.98	.16+.74i	.16-.74i	-.66+.64i
Inverted MA Roots	.98	.27+.9	.27-.92i	-.62

Source: Based on Authors' Data Analysis

From the above regression equation it can be noted that log of imports from India is dependent variable. Sample period of the equation is for the period of 1991 to 2014. R square and adjusted R square indicates that the equation fits well. Autoregressive -1 is significant at 1% level of significance. Moving average (1), moving average (2), moving average (4) indicates significance at 1% level of significance. Durbin Watson statistics indicates no autocorrelation; F statistics is significant at 1% level of significance. Table 3 below reports the result of regression equation considering dependent variable as log of Trade ratio where we did ARMA model:

**Table:3** Result of the regression equation on Trade Ratio

Dependent Variable: LTRADE\_RATIO  
Method: Least Squares  
Sample (adjusted): 1992 2014  
Included observations: 23 after adjustments  
Convergence achieved after 83 iterations  
MA Backcast: OFF (Roots of MA process too large)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.131033	0.050321	42.34847	0.0000
AR (2)	0.450850	0.041450	10.87699	0.0000
MA (1)	-1.072187	0.437441	-2.451047	0.0261
MA (2)	-1.129435	0.453246	-2.491880	0.0241
R-squared	0.823589	Mean dependent var		2.082005
Adjusted R-squared	0.790512	S.D. dependent var		0.188710
S.E. of regression	0.086372	Akaike info criter		-1.883441
Sum squared resid	0.119363	Schwarz criterion		-1.684295
Log likelihood	22.83441	Hannan-Quinn criter		-1.844566
F-statistic	24.89910	Durbin-Watson stat		2.265035
Prob (F-statistic)	0.000003			
Inverted AR Roots	.67	-.67		
Inverted MA Roots	1.73	-.65		
Estimated MA process is noninvertible				

Source: Based on Authors' Data Analysis

From the Table: 3 regression equations it can be noted that log of trade rate is dependent variable. Sample period of the equation is for the period of 1992 to 2014. R square and adjusted R square indicates that the equation fits well. Autoregressive -2 is significant at 1% level of significance. Moving average (1), moving average (2), moving average (4) indicates significance at 5% level of significance. Durbin Watson statistics indicates that autocorrelation is significant at 1% level of significance.