

The Impact of Trade Agreements on Exports: Empirical Evidence from SAARC Countries

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Abstract

South Asian Association for Regional Cooperation (SAARC) was conceived with the primary aim of strengthening regional cooperation, promoting political stability, accelerating economic growth and reducing poverty. Although the developing nations in this bloc have been taking painstaking endeavors to implementing reforms and enhancing intra-regional trade through bilateral trade agreements, however, researchers argue that these objectives remain as elusive as it was two decades ago. Against this backdrop, this paper investigates the impact of trade agreements among South Asian nations on the volume of exports. Specifically, the paper estimates a gravity model using a panel dataset for the period 1971-2005. Empirical tests find no evidence of the impact of trade agreements on exports for the pre-SAARC and pre-SAPTA periods, but a significant positive impact is observed in the post-SAARC and post-SAPTA periods. This propensity is discernible regardless of which estimation methods are applied. Further tests confirm that the positive impact emanated not entirely as a result of the SAPTA per se, but it is rather the combined effect arising from the delayed impact of the existing trade agreements. Findings clearly indicate positive benefits of having free trade agreements and deeper economic integration among SAARC countries.

Keywords: SAARC; SAPTA; intra-regional trade; trade agreements; gravity model

JEL Classification: C23; F17

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1. Introduction

The issue of free trade and regional economic cooperation is becoming synonymous with trade liberalization and a subject of avid interest in the arena of international trade and politics today. It has been essentially taking the form of bilateral trade agreements (BTAs), preferential trading arrangements (PTAs), regional trading arrangements (RTAs) and free trade agreements (FTAs). The South Asian Association for Regional Cooperation (SAARC) was conceived in Dhaka, Bangladesh on December 8, 1985 by late president Ziaur Rahman of Bangladesh with the broad objectives of economic, social, cultural and scientific cooperation among seven South Asian nations, namely, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.

South Asia is home to more than one-fifth of the world's population, and therefore, it is believed to have the potential to become an area of great prosperity based on the idea of growing trade among the member countries. Increased trade, particularly intra-regional exports, is expected to be a driving force for economic growth in the region. To this end, South Asian Preferential Trading Arrangement (SAPTA) was signed in Dhaka on April 11, 1993 to give boost to regional trade integration, which came into operation in 1995. Four rounds of exchange of trade concessions have taken place under the SAPTA.¹ A large number of products have been offered concessions exclusively to Least Developed Countries (LDCs). India has offered the largest number of concessions, particularly favoring LDCs with tariff preferences ranging from 50-100 percent (Mukherji, 2004).

Prompted by the worldwide trends and successful experience of India-Sri Lanka bilateral FTA, leaders of SAARC countries have decided to facilitate intra-regional trade with the signing of South Asia Free Trade Area (SAFTA) on January 6, 2006. Based on this, the SAARC members will bring down the average tariffs on goods from 25-30 percent to 0-5 percent over the next decade. Separate deadlines have been set for the developing countries, i.e., India, Pakistan and Sri Lanka, and the LDCs, which are Bhutan, Bangladesh, Maldives and Nepal. SAFTA calls for reduction in import duties to 20 percent by 2006 and between 0-5 percent by 2013, but allows the LDCs to reduce the tariff rates to 0-5 percent by the year 2016 (Singh, 2005). Another notable initiative that brightens the outlook for regional free trade is the signing of framework agreement for the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation (BIMSTEC) in Phuket, Thailand in February 2004. The group members comprise of five South Asian countries, namely, Bangladesh, Bhutan, India,

¹ See Appendix 1 for exposition of SAPTA.

Nepal and Sri Lanka, and two Southeast Asian countries, Myanmar and Thailand (RIS, 2005). Hence, this framework is viewed as a bridge between South Asia and South East Asia.

Like the European Union (EU) and other like-minded trade blocs, SAARC countries share a lot of similarity in culture and socio-economic conditions among themselves, but as opposed to the EU countries that have deep connections in political, economic and executive areas, members in SAARC bloc are all poor and in their developing phases, and are characteristically far less integrated. Many researchers argue that the volume and magnitude of intra-regional trade continues to be low, despite SAARC's efforts to enhance intra-regional trade through bilateral and preferential trading arrangements. Hirantha (2004) contends the reasons for low trade as limited number of concessions offered under the agreement, irrelevance of much of the concessions offered, narrow depth of tariff cuts, failure to deal with non-tariff issues, and restrictive rules of origin. Likewise, Singh (2005: 1) cites the lack of trade complementarities, prevalence of sizeable informal trade, and political tensions as some of the "culprits". In the earlier study, Panagariya (2003: 1281) also reports the existence of informal trade and "autarkic policies" in the region. In addition, Taneja (1999) points out that high transaction costs induced by inefficient institutional designs and policy environment are the key factors diverting trade between India and its smaller neighbors into informal channels, which also explains the low levels of trade in the region. According to Taneja, the informal trade between India and Pakistan alone ranges between US\$250 million to US\$2 billion.

In view of the downsides, SAARC recognizes the need to move towards a more pragmatic approach to regional cooperation. Over the years, the seven South Asian nations have signed several trade agreements (see Appendix 2). However, none of the earlier studies has attempted to measure the actual impact of trade agreements on intra-SAARC trade. Moreover, most of the studies have omitted the effect of small countries, such as Bhutan and Maldives, in their analyses. This may be partly due to lack of data and smallness of economic size, or perhaps due to lack of researchers' interest for its negligible influence in the region. Whatsoever the reasons are, there is an apparent need to fill up this vacuum. Hence, examining the feasibility and potential of South Asian economic cooperation is a highly desirable case study.

The main objective of this study is to investigate whether the trade agreements among seven SAARC countries have actually boosted the volume of trade in the region. Specifically, the paper addresses the following key questions:

- What is the actual impact of trade agreements among SAARC countries?
- Have they affected positively or negatively on the growth of exports?

- Has the signing of SAPTA helped to promote intra-SAARC trade?

One of the contributions of this paper is, therefore, to answer the above questions and to provide further evidence by estimating a gravity model, which uses a distinctive panel dataset for over a long period spanning 35 years from 1971 to 2005. This period is preferred for three reasons. First, there are no other studies conducted for the SAARC region that seeks to investigate trade effects over this long period of time. Second, Bangladesh became an independent country in the year 1971.² Third, this long period facilitates the dataset to be divided into sub-periods, enabling to contrast and examine the impacts of trade agreements on exports in different time periods. While addressing the above-mentioned questions, this study also tests the efficacy of free trade agreements and SAPTA in furthering exports, and particularly for the SAARC region, this is the first of its kind. The focus, as such, is to recount the findings after testing the effects of trade agreements before the inception of SAARC and SAPTA, and comparing with the post-SAARC and post-SAPTA periods.

The findings in this paper are striking as opposed to what has been generally perceived. Although empirical results find no indication of the impact of trade agreements on exports for the pre-SAARC I, pre-SAARC II and SAARC I periods, but a significant positive impact of trade agreements on exports is detected for SAARC II (or post-SAPTA period) and for SAARC I+II. This tendency is manifested irrespective of which estimation methods are applied. Tests also demonstrate that the increase in the volume of exports during the last two sub-periods emanated from the combined effect of SAPTA and the existing trade agreements among SAARC countries. However, there is a time-lag for actual effects of trade agreements to transpire. Thus, results clearly support the case for FTAs and deeper economic integration among SAARC countries.

The remainder of the paper is organized as follows: Section 2 provides the theoretical foundation and assessment of regional trade integration in South Asia. The empirical methodology and sources of data is presented in Section 3 and Section 4, respectively. The regression results are examined in Sections 5, while Section 6 summarizes the key findings and concludes the paper.

2. Theoretical Underpinning

Review of literature discloses that there is a not much extensive study on the effects of South Asian trade integration. While there are some qualitative studies on SAARC and SAPTA, quantitative studies centering on economic integration in South Asia are limited.

² Bangladesh declared independence from Pakistan on March 26, 1971.

Bandara and Yu (2003) point out a number of possible reasons for this. Firstly, many trade analysts have not given much attention, since this region did not play a major role in the global trade, investment and growth. Secondly, the data on trade and other variables in this region are scarce. Thirdly, as the volume and value of informal trade are very high in the region, published data do not reflect the true picture of trade structure in the region. Finally, while there is much focus on non-tariff barriers compared to many other regions in the world, the recognition and quantification of non-tariff barriers are difficult.

Despite the limitations, available studies may be broadly classified into three different views, i.e., pessimistic, optimistic, and neutral or cautionary. From the pessimistic point of view, Hassan et al. (2001) finds that SAARC countries have not only reduced trade among them but also reduced trade with non-members. Singh (2005) observes the intra-regional trade low at about only 5 percent of the total trade. Chowdhury (2004) examined the issue of convergence of per capita GDP across SAARC countries. The results from his analysis fail to find evidence of convergence. The reasons for non-convergence of per capita GDP is explained by low and falling volume of intra-country trade, weak governance, and low level of growth of individual SAARC countries. Jayaratne (2004) also points out that some issues that have prevented effective regional integration of South Asian nations from more rapid development and benefiting from cross border and global trade and investments are political disputes and mistrust, macro-economic instability, policy and regulatory deficiencies, lack of a common position and uniform rules, and low implementation capability among others.

Pitigala (2005: 42) shows that South Asian countries can be characterized as only moderately “natural trading partners”. The paper establishes through additional statistical measures including revealed comparative advantage indices, trade concentration and trade competition profiles that the trade structures among the South Asian countries may not facilitate a rapid increase in intra-regional trade.

In comparison with the rest of the world, the economic size of the SAARC region is small in terms of both GDP and share in the world trade. Recent studies show the economic case, even for SAFTA as quite weak.³ Baysan et al. (2006) argues that it is quite unlikely that trade diversion would be dominant as a result of SAFTA, as it is reinforced by high levels of protection in the form of restrictive sensitive lists and stringent rules of origin. In this regard, it would be pertinent to quote Kalegama (2004) who echoes that “... not much can be expected from SAFTA. The initial euphoria that comes with the signing of the SAFTA agreement will

³ Examples of few other studies focusing on SAFTA are by Asaduazzaman et al. (2004); Jamil (2004); and USAID (2005).

soon taper away. The realities and the geo-politics of the region will once again determine the pace of negotiations in SAFTA.”⁴

On the other hand, optimists including Bandara and McGillivray (1998) describe signs of progress in liberalizing South Asian trade regimes in the 1990s, even if most of the programmes in South Asian countries, with the exception of Sri Lanka, have been slow. They find the recent economic growth in the region quite satisfactory and are likely to continue in the near future. Perhaps, it is for this reason that Bhargava (1998: 22) suggests South Asians to learn from the European experience. He believes that “the coming decades will witness meaningful cooperation between the two largest configurations of democratic states in the continents of Europe and Asia in order to build a better world.” The recent move by EU to become an observer in the SAARC group, indeed, forms the basis towards his line of thinking.

Mohanty (2003) emphasizes that the region has a substantial potential for trade and investment. He rejects the hypothesis that South Asian countries compete among themselves to export similar kind of products to the world market leading to very low level of regional trade. His study finds a significant level of trade potential in the region to promote intra-regional trade. He estimates the export potential of the region to be more than *six times* than the present level of intra-regional trade if it is harnessed completely.

Mukherji (2004) reckons that bilateral trade among member countries can be self-sustaining when backed by investment linkages. His work demonstrates some modalities by which SAPTA could transform swiftly to SAFTA. He stresses that the Trade Liberalization Programme under SAFTA must take more consolidated approach by removing a variety of non-tariff barriers, and setting well-defined targets to promote a number of trade facilitation measures. Likewise, CUTS (2005: 3) notes, “SAFTA would be a vehicle through which all participants can gain by exploring their competitive advantages. Integration of economies in South Asia would lead to the emergence of a big market for investors.” In a most recent study on SAFTA, Rodríguez-Delgado (2007) estimated the economic impacts of SAFTA using a gravity model covering the data from 1988-2004. The author examined the impact of tariff reductions on the dependent variable GDP. He estimates that SAFTA can provide the highest increase for SAARC countries in terms of trade flows that they could expect from any RTAs.

Dash (1996) argues from a neutral or more or less cautionary perspective that given the low level of mutual trust, spillover effects of the ethnic and religious conflicts, and the magnitude of bilateral disputes in South Asia, it is unrealistic to believe that any substantial growth of regional cooperation is possible without easing political tensions. To evaluate the

⁴ See <http://www.southasianmedia.net/Magazine/Journal/safta_critique.htm> [Accessed August 20, 2006].

magnitude of preferential trade under SAPTA, Mukherji (2000) estimated the extent of trade preference under all SAPTA rounds in terms of trade values and percentages of preferential imports. The estimates show that the region's total preferential imports amounted to about US\$479.8 million, nearly half of which went to Pakistan. India's share of preferential trade out of total regional preferential imports was about 26 percent, while that for Sri Lanka was about 16 percent. In terms of its total regional imports, he finds that Pakistan had the highest coverage of preferential imports (about 40 percent), followed by Nepal (35 percent), India (30 percent), Bhutan (17 percent) and Sri Lanka (12 percent).

Using gravity equation and a panel data for 1996-2002, Hirantha (2004) showed a strong evidence of trade creation in the region with no trade diversion effect as far as trade with non-members is concerned. Pattanaik (2006: 140) also has more of a cautionary approach to SAARC's future. He opines that if SAARC continues to remain "stymied" and the smaller states do not actively integrate, even India's hopes of integrating with other relevant groups will be stifled. The smaller members that seek to gain from opening of large and growing Indian economy would also be the losers if SAARC does not prosper. Accordingly, Ghani and Din (2006: 4) construe that an effective implementation of SAFTA and other regional initiatives "will require a strong willingness of all members for greater economic integration as well as a favorable political environment in the region."

Kemal (2004) describes that the trade patterns of the SAARC group vary sharply from country to country. For instance, the share of intra-regional imports in total imports in 2000 for Bangladesh, Nepal and Sri Lanka stood at 11.7 percent, 33.2 percent and 10.1 percent respectively. During the same year, Pakistan and India met only 2.3 percent and 0.7 percent respectively of their import requirements from the region. Taneja (2006) points out that South Asia is the least integrated region compared to the East Asia, Central Asia, Europe, Latin America, the Middle East and North Africa. Intra-regional trade in South Asia is only 0.8 percent of GDP, one-eighth of the Latin America's level and only a fraction of East Asia's nearly 27 percent of GDP. However, India's share in total SAARC trade increased from 38 percent in 1991 to 45 percent in 2004. Therefore, the author believes that if India and Pakistan could tap the region's trade potential, intra-SAARC trade could undoubtedly reach newer heights.

Another topic currently under review is the issue on adopting a common currency in the region. For instance, Saxena (2005) probes if SAARC countries can satisfy the criteria to form an optimal currency area. The author surmises that the benefits of a common currency

would materialize from peace between India and Pakistan that economic integration would bring about.

In sum, we might as well recapitulate that the future of SAARC countries depends, *inter alia*, not only on the level of economic integration but it is also largely determined by soundness of political economy in South Asia. Without easing political tensions, conflicts, and bilateral disputes among the member nations, it is quite unlikely to hope for any substantive trade integration in the region. Thus, the growth of regional economic cooperation in South Asia additionally calls for requirement of conscious efforts as well as demonstration of strong political will from all South Asian leaders at the highest level to bring about peace, harmony, and social security in the region.

3. Empirical Methodology

This paper examines the impact of trade agreements on the volume of exports using a gravity model and a panel dataset for seven SAARC countries for the period from 1971 to 2005. Gravity model is chosen because it is a conventional empirical device most commonly and efficiently used to estimate a range of phenomena on international trade since the last 40 years. According to Rose (2004: 99), the gravity model is a successful model for two reasons. First, the estimated effects of distance and output, *i.e.*, the traditional gravity effects are “sensible, economically and statistically significant, and reasonably consistent across studies.” Second, it is “reliable, explains most of the variations in international trade and fits the data well.” Although gravity models have been criticized for its lack of theoretical foundations, Harris and Mátyás (1998: 3) notes that “empirically (especially in forecasting) they seem to perform particularly well, and are therefore well suited for policy analysis.” Bayoumi and Eichengreen (1997: 142) affirm that the gravity equation has “long been the workhorse for empirical studies of the pattern of trade.”⁵

The gravity equation is especially popular for statistical analyses of bilateral flows between different geographical entities. Deardorff (1998) demonstrated that the use of gravity equations could be justified by international trade theories such as the Heckscher-Ohlin model. The gravity equation can be usefully exploited in studying “the *ex post* effects of FTAs and customs unions on bilateral merchandise trade flows.” It can be characteristically used to explain cross-sectional variation in trade flows of two trading countries in terms of their incomes, distance between trading pairs, and dummy variables for common languages and

⁵ Gravity models have been universally used as early as in the 1940s. It has also been used in the field of geochemistry, geophysics, investment decision, regional migration, etc. More discussion on gravity models can be found in Linneman (1966), Anderson (1979), Bergstrand (1989), Thursby and Thursby (1987), Brad (1994), Head (2003), Kandogan (2004), Anderson and Wincoop (2003), Kristjánsdóttir (2005), and Okubo (2006).

land borders, and for presence or absence of an FTA (Baier and Bergstrand 2005: 1). In fact, the Nobel laureate Jan Tinbergen (1962) first introduced an econometric study using the gravity equation for international trade flows that incorporated the dummy variable for FTA to evaluate its effect on trade.

In light of the above considerations, this paper estimates a more generalized gravity model, also known as the ‘unilateral exports model’, which was applied in earlier works of Mátyás et al. (2000) and Aristotelous (2001), and more recently by Baak (2004) and Billen et al. (2005). With a slight modification from a typical gravity model, the generalized gravity model assigns not the product of the exports of two trading countries as in the paper by Dell’Ariccia (1999), but the exports from one country to another as the regressand. The advantage of this is that it allows us to include depreciation of exporting country’s currency value as one of the regressors that affects the volume of exports. Moreover, since small countries are expected to export less than big countries, *ceteris paribus*, the dummies for exporting countries can be included (Baak 2004: 100). As initiated by Rose (2004: 99), the gravity equation in this paper is further augmented by controlling for a number of “natural causes of trade” or “extraneous factors” including in economic, cultural, political and geographical variables that may affect trade.

Regressions are designed in such a way as to capture the effects of trade agreements with respect to both Pre-SAARC and Post-SAARC periods. The sample is broken down into five groups. Table 1 shows the design of regressions conducted in this study. Only five countries are included in the Pre-SAARC I Period (1971-1979) owing to missing data for the period before 1980 for two countries, Bhutan and Maldives. All other periods include seven countries.⁶

3.1 Model Specification

As aforementioned, the gravity equation in this paper is different for two reasons. First, the model does not use the total trade flows comprising exports and imports, but exports from one country to another as the regressand. Intuitively, exports of one country are the imports of another country. When both exports and imports are accounted for in trade flows, and if imports are registered much higher than exports, the volume of trade may seemingly be inflated. Moreover, exports in a sense tend to have economic characteristics associated (in theory) with welfare-enhancing net trade creation effect. Second, this model does not include the exporting country’s GDP as one of the regressors to avoid endogeneity problems, as exports form part of the exporting country’s GDP (Billen et al., 2006).

⁶ Afghanistan is excluded in this study, as it was formally included as the eighth member of the South Asian grouping in the 14th SAARC Summit held in New Delhi on April 3-4, 2007.

Accordingly, the gravity model takes the following form:

$$\begin{aligned}
\ln(X_{ijt}) = & \mathbf{b}_0 + \mathbf{b}_1 \ln(GDP_{jt}) + \mathbf{b}_2 \ln(POP_{it}) + \mathbf{b}_3 \ln(DREX_{ijt}) \\
& + \mathbf{b}_4 \ln(DIST_{ij}) + \mathbf{b}_5 BORD_{ij} + \mathbf{b}_6 LANG_{ij} + \mathbf{b}_7 CURR_{ijt} \\
& + \mathbf{b}_8 TRAG_{ijt} + \mathbf{b}_9 CONF_{ijt} + \mathbf{b}_{10} MEMB_{ijt} + \mathbf{b}_{11} LLOCK_{ij} \\
& + \mathbf{b}_{12} ILAND_{ij} + \mathbf{b}_{13} PORT_{ij} + \mathbf{b}_{14} SAPTA_{ijt} + \mathbf{d}_2 CD_2 + \dots \\
& + \mathbf{d}_7 CD_7 + \mathbf{f}TD + \mathbf{e}_{ijt}
\end{aligned} \tag{1}$$

where i , j and t stands for exporting country, importing country and time, respectively; X_{ijt} denotes real exports from i to j at time t ; GDP_{jt} is the real gross domestic product of j at time t ; POP_{it} is the population of i at time t ; $DREX_{ijt}$ is the depreciation rate of the real bilateral exchange rate of i with respect to j at time t ; $DIST_{ij}$ is the great circle distance between i and j ; $BORD_{ij}$ is a dummy variable⁷ which is one if i and j share a common border, and zero otherwise; $LANG_{ij}$ is a dummy variable which is one if i and j share a common language, and zero otherwise; $CURR_{ijt}$ is a dummy variable which is one if i and j use common currency⁸ at time t , and zero otherwise; $TRAG_{ijt}$ is a dummy variable which is one for having trade agreement between i and j at time t , or zero otherwise;⁹ $CONF_{ijt}$ is the index value for conflict between i and j at time t ;¹⁰ $MEMB_{ijt}$ is a dummy variable for membership in other regional trade group(s), which is one if i and j are part of a common free trade area at time t , and zero otherwise; $LLOCK_{ij}$ is a dummy variable equal to one if a country is landlocked, and zero otherwise; $ILAND_{ij}$ is a dummy variable equal to one if a country is an island, and zero otherwise; $PORT_{ij}$ is a dummy variable equal to one if a country has access to seaports, and zero otherwise; $SAPTA_{ijt}$ is a dummy variable for South Asian Preferential Trading Arrangement, which is one if i and j are part of this agreement at time t , and zero otherwise; CD and TD denote country dummy and time trend dummy respectively; \mathbf{b} , \mathbf{d} and \mathbf{f} are vectors of nuisance coefficients; and \mathbf{e}_{ijt} is the error term or any other omitted influences assumed to be well-behaved.

More specifically, the paper estimates a pooled ordinary least squares (OLS) data model, but for robustness checks it also performs some sensitivity analyses using country and time dummy effects, first differencing, instrument variables (IV), fixed effects and random

⁷ See Appendix 3 for description of dummy variables.

⁸ Common currency essentially means that money is interchangeable between the two countries at a 1:1 par for an extended period of time and there is no need to adjust prices.

⁹ Trade and transit arrangements including the BTAs and FTAs are collectively included under the term trade agreements (*TRAG*). See Appendix 2 for details.

¹⁰ See Appendix 4 for description of conflict index.

effects models.¹¹ The parameters of interest are \mathbf{b}_8 , \mathbf{b}_9 and \mathbf{b}_{14} , i.e., the coefficients for trade agreement (*TRAG*), conflict (*CONF*), and South Asian Prudential Trading Arrangement (*SAPTA*), respectively. Except for dummy variables, all other variables take on log values to narrow the range of variable and to make estimates less sensitive to outlying or extreme observations on the regressand and regressors. The novelty of this paper is that the effect of *TRAG* is measured vis-à-vis *CONF* that might likely offset for any frailty of results obtained by using only *TRAG* as one of the regressors.

3.2 Correction for Endogeneity Bias and Heteroskedasticity

In order to mitigate the potential endogeneity bias resulting from a possible correlation between the *TRAG* and unobserved characteristics, this paper follows some corrective procedures as inspired by earlier researchers. Baier and Bergstrand (2005) distinguish a standard problem in cross-section empirical work is the potential endogeneity of right-hand side (RHS) variables. If any of the RHS variables in equation (1) is correlated with the gravity equation error term \mathbf{e}_{ijt} , the variable is considered econometrically endogenous and the OLS may yield biased and inconsistent coefficient estimates. They argue that the potential endogeneity bias of RHS variables may arise due to omitted variables, simultaneity, and measurement error. In fact, omitted variables are often the major source of endogeneity bias in gravity equations. Particularly with respect to bilateral trade arrangements, the unobserved heterogeneity in trade flow determinants is associated with the decision of whether or not to form an FTA. For instance, in their earlier work, Baier and Bergstrand (2004: 6-8) find strong empirical evidence that pairs of countries that have FTAs are likely to share similar economic characteristics. That is, the probability of two countries' governments seeking to enter into FTA may be high if they expect a large welfare gain from potential bilateral trade creation further deepening liberalization beyond tariff barriers and other non-tariff barriers into "domestic regulations". Therefore, they underscore the importance of addressing the endogeneity by estimating the average treatment effects (ATE) of FTAs on trade flows. This means that $TRAG_{ijt}$ and the intensity of domestic regulations could be positively correlated, but \mathbf{e}_{ijt} and the intensity of domestic regulations could be negatively correlated. As a result, $TRAG_{ijt}$ and \mathbf{e}_{ijt} can be negatively correlated, and the $TRAG_{ijt}$ coefficient will tend to be underestimated. Fortunately, for cross-section data, we can address the problem of omitted variables by including IV; and with panel data, fixed effects and first differencing can be effectively applied to treat endogeneity biases (see Wooldridge, 2003).

Mátyás (1997, 1998), and Harris and Mátyás (1998) also suggest a pooled time-series of cross-sections, or panel data of the countries of interest, in order to identify these biases and

¹¹ See also Harris and Mátyás (1998), Mátyás *et al.* (2000), Baak (2004), Baier and Bergstrand (2005), and Rahman (2005).

correctly specify the econometric model. They advocate the panel data to increase degrees of freedom, to enable identification of business cycle and correctly account for exporting and importing country effects. Such effects can be treated as constants and estimated by fixed effects model in which one is able to identify separately the unobserved effects of those countries that have strong propensities to export and import, once divergences in other factors such as GDP, population, distance, etc. has already been accounted for. As recommended in Harris and Mátyás' work, this paper also additionally considers a random effects model, where the unobserved effects is assumed to be uncorrelated with the explanatory variables in each time period.

In addition, all estimations employ heteroskedasticity consistent covariance matrix estimator derived by White (1980), which provides correct estimates of the coefficient covariances in the presence of heteroskedasticity of unknown form. Serial correlation is not an issue because the samples are independent across time.

3.3 Computation of Variables

Some of the key economic variables in this model have been computed as follows:¹²

3.3.1 Real Exports

The real exports (X_{ijt}) from country i to country j is defined as

$$X_{ijt} = \ln \left(\frac{NX_{ijt}}{USD_t} \times 100 \right) \quad (2)$$

where NX_{ijt} is the annual nominal exports (in US dollars corrected for PPP) from country i to country j in year t , and USD_t is the US GDP deflator¹³ in year t .

3.3.2 Real GDP

The real GDP of an importing country j (GDP_{jt}) is defined as

$$GDP_{jt} = \ln \left(\frac{NGDP_{jt}}{USD_t} \times 100 \right) \quad (3)$$

where $NGDP_{jt}$ is the nominal GDP of country j measured by purchasing parity, and USD_t is the US GDP deflator in year t . This variable is a proxy for economic mass or size of the trading country.

3.3.3 Depreciation of real bilateral exchange rate

The depreciation rate of an exporting country's currency value ($DREX_{ijt}$) is determined as

¹² Baak (2004) and Billen et al. (2005) have espoused this technique.

¹³ Eichengreen and Irwin (1996) and Baier and Bergstrand (2005) also scaled the data by GDP deflators to generate real exports and real GDPs.

$$DREX_{ijt} = \ln(REX_{ijt}) - \ln(REX_{ijt-1}) \quad (4)$$

where REX_{ijt} is the real exchange rate, which is measured as

$$REX_{ijt} = NEX_{ijt} \times \frac{CPI_{jt}}{CPI_{it}} \quad (5)$$

where NEX_{ijt} is the average nominal exchange rate between country i and country j in year t , and CPI_{it} and CPI_{jt} denote consumer price index of country i and country j respectively in year t . This variable stands as a proxy for prices.

3.4 Expected Signs of Coefficients

The assumptions of the model are that trade between two countries is proportionate to an increase in their real GDP and population. Therefore, \mathbf{b}_1 and \mathbf{b}_2 are expected to have positive signs. The real GDP of the country of destination is expected to have a positive effect on exports, as larger economy means a larger demand, including foreign products. The effect of population of the country of origin on exports should also be positive as countries with a large population are expected to export more. Notwithstanding, there are mixed results, since Fitzsimons, et al. (1999) and Billen et al. (2005) find a positive relationship between exports and population, while Dell'Araccia (1999) finds a negative coefficient.

If depreciation rate of the currency value of exporting country rises, then exports of that country is expected to increase implying that the sign of \mathbf{b}_3 will be positive. Depreciation of currency value of exporting country generally stimulates exports, since a lower value of the home currency with respect to the foreign currency means that home products become cheaper abroad contributing to an increase in exports. However, the sign may not always be consistent. For instance, Baak (2004) finds a significant positive relationship between depreciation and exports, whereas Billen (2005) finds it insignificant.

Farther the distance between two countries, higher the transportation costs and thus lowers exports. Theoretically, distance is a proxy for transport costs, but it may also be that greater geographic distances are correlated with other costs like synchronization costs, transaction costs, communication costs, and larger cultural differences. Cultural differences can impede trade in many ways, such as inhibiting communication, generating misunderstandings, clashes in negotiation styles, etc. This means that \mathbf{b}_4 will be negative. On the contrary, an increasing function when two countries share a common land border, common language and common currency means that, \mathbf{b}_5 , \mathbf{b}_6 and \mathbf{b}_7 will be positive.

Trade agreements may stimulate exports because of various trade-boosting efforts such as reduction of tariff and non-tariff barriers among member countries. Accordingly, \mathbf{b}_8 is

generally expected to be positive. Past empirical studies such as by Bergstrand (1985), Dell’Ariccia (1999), Taglioni (2002), Billen et al. (2005), and Baier and Bergstrand (2005) support these assumptions. However, some earlier studies point out mixed results. For example, Aitken (1973), Abrams (1980), and Brada and Mendez (1983) find the European Community (EC) bloc to have an economically and statistically significant effect on trade flows among members, but Bergstrand (1985) and Frankel, Stein and Wei (1995) find insignificant effects. Frankel (1997) found positive significant effects from Mercosur bloc, insignificant effects from the Andean Pact, and significant negative effects from membership in the EC. Other studies similarly report flimsy results, such as by Boisso and Ferrantino (1997), Oguledo and MacPhee (1994), and Ghosh and Yamarik (2004).

Conflict among trading partners would in general weaken trade, and membership in other regional trade groups (ORTG) may impact negatively on intra-regional exports since member countries may have more trade with other trade blocs; hence, b_9 and b_{10} are expected to be negative. Exports may fall for landlocked and island countries if they are disadvantaged by difficult topography and isolation.¹⁴ On the contrary, access to seaports generally enhances trade. Hence, b_{11} and b_{12} are expected to be negative, while b_{13} is expected to be positive.

4. The Data

The data in this paper come from a wide range of sources. Annual nominal exports data (in million US\$) from the year 1971 to 2005 have been compiled from the IMF’s Direction of Trade Statistics (DOTS). Missing exports data have been supplemented from the UN Comtrade and UNCTAD Handbook of Statistics.¹⁵ Nominal GDP (in constant 2000 US\$) and population data were obtained from the World Bank’s World Development Indicators (WDI). The US GDP deflator, nominal exchange rates, and consumer price indices have been gathered from the IMF’s International Finance Statistics (IFS).¹⁶

The data for distances between two countries were calculated using the Great Circle Distance Between Capital Cities¹⁷ and Time and Date.com.¹⁸ The geographical distance is the theoretical air distance, i.e., the great circle distance. Unless the capital cities of two trading countries are major hubs or trade centers, this paper considers the distance between the major

¹⁴ Frankel and Rose (2000) and Jansen and Nordas (2004) also note that remoteness have a negative and significant effect on trade.

¹⁵ UN Comtrade is available at <<http://unstats.un.org/unsd/comtrade/>> and UNCTAD Handbook of Statistics is available at <<http://stats.unctad.org/Handbook/ReportFolders/ReportFolders.aspx>>.

¹⁶ WDI 2004 CD-ROM in combination with Online WDI 2005 and Online IMF’s IFS have been used extensively.

¹⁷ Available at <<http://www.wcrl.ars.usda.gov/cec/java/capitals.htm>>

¹⁸ Available at <<http://www.timeanddate.com/worldclock/distance.html>>

trade centers of two countries. This is because if the great circle distance is measured between the capital cities of two countries, it could probably underestimate or overestimate the actual gravity factor between two trading partners. Such bias in the gravity component is especially true for a big country like India. For instance, the closest trade centers for India and Sri Lanka is Chennai (trade center in South India) and Colombo (capital city of Sri Lanka), instead of New Delhi (capital city of India) and Colombo; while for India and Bangladesh, the closest port cities are Kolkata (in northeast India) and Chittagong (but not Dhaka – the capital city), respectively.

The index for conflict variable was taken from Conflictbarometer 2005, Heidelberg Institute for International Conflict Research, Department of Political Science, University of Heidelberg.¹⁹ Other country-specific variables such as border, language, currency, trade agreements, membership in other regional blocs, landlocked and island and status and seaports were obtained from the CIA's The World Factbook,²⁰ Perry-Castañeda Library Map Collection,²¹ SAARC's official homepage and related websites.

Additionally, as evoked by Baier and Bergstrand (2005), this paper also introduces some 'political variables' as instruments (z variables hereafter) that might have some correlation in two governments' decision to form an FTA, but may not have correlation with their exports. Past studies, such as by Jagers and Gurr (1999), Mansfield et al. (2002), and Kaufmann et al. (2003) reflect the fact that two countries are more inclined to form FTAs if their governments are more democratic. Therefore, three governance indicators²² have been selected as z variables from the World Bank's Governance and Anti-Corruption, as F Test suggests that they are jointly significant. These are: (i) Voice and Accountability (*VOICE*), (ii) Rule of Law (*RULAW*), and (iii) Control of Corruption (*NOCORPT*). *VOICE* represents citizens' democratic rights, and it measures the extent to which citizens of a country can participate in the decision-making process of the government. *RULAW* is the principle that governmental authority is legitimately exercised in accordance with written, publicly disclosed laws adopted and enforced in accordance with established procedure. The principle is intended to be a safeguard against arbitrary governance. *NOCORPT* is a concept that is meant to repress any organized, interdependent system in which part of the system is either not performing duties it was originally intended to, or performing them in an improper way, to the detriment

¹⁹ Available at <<http://www.hiik.de/en/barometer2005/ConflictBarometer2005.pdf>>

²⁰ Available at Central Intelligence Agency (CIA)'s <<https://www.cia.gov/cia/publications/factbook/index.html>>

²¹ Available at <<http://www.lib.utexas.edu/maps/world.html>>

²² The governance indicators data is obtained from The World Bank official site, Governance and Anticorruption, available at: <<http://info.worldbank.org/governance/kkz2005/tables.asp>>

of the system's original purpose. The variables are measured in terms of percentile rank (0 to 100) – zero representing as the lowest and 100 as the highest.

5. Empirical Results

5.1 Pooled OLS Estimation (Benchmark)

As depicted earlier in Table 1, this analysis performs estimations after splitting the whole sample period (from 1971 to 2005) into five sub-periods. Table 2 presents the estimation results for pooled OLS data. The following findings emerge from the estimation. The estimated coefficients values are conventional and quite stable across all sub-periods. The coefficients for gross domestic product (*GDP*), population (*POPN*), depreciation rate of real bilateral exchange rate (*DREX*), distance (*DIST*), border (*BORD*), currency (*CURR*), trade agreement (*TRAG*), conflict (*CONF*) and membership in ORTG (*MEMB*) are statistically significant and the signs are mostly as expected. While countries with seaports (*PORT*) have positive and significant coefficient, landlocked (*LLOCK*) and island countries (*ILAND*) show negative and/or insignificant impacts on exports in general, which are also as expected. The negative coefficient for *MEMB* is expected and supports the findings of Pitigala (2005: 42) as SAARC members are only moderately “natural trading partners” for most SAARC members demonstrates a tendency to trade outside the region.

In contrast to our expectations, the coefficient for *DIST* is counterintuitive and statistically significant at 10 percent level of significance in the sub-period 1. One principal reason for this can be attributed to the fact that the closest neighbors, namely, India, Pakistan and Bangladesh were completely estranged against each other during the period on account of the 1971 Bangladesh Liberation War (*Mukti Juddho*) or what is commonly known as the Indo-Pakistan War of 1971. Hence, trade plummeted sharply for these countries during the period. The only two countries that were engaged in formal trade were Nepal and Sri Lanka, which are the most distant countries in the region. Therefore, in this case, the result cannot be interpreted in a causal fashion.

The coefficients for *LLOCK* and *PORT* are also more or less consistent to our expectations. However, the negative coefficient for *PORT* in the sub-period 2 could appear as result of repercussions of the war among three major nations in the earlier sub-period 1, as noted above.

One result that attracts our attention is the negative and statistically significant coefficient for language (*LANG*) for the sub-period 2 through 5, while our common sense tells us that it should have a positive coefficient. The reason goes back to none other than the

above-mentioned interpretation, wherein most of the trading partners in the region with similar languages have been exhibiting animosity against each other due to history of war and contentions, thereby resulting in less trade and nullifying the expected positive impact.

Another parameter of interest is the coefficient for *CONF*, which is negatively associated with exports at 1 percent significance level against a two-sided alternative across all periods. In sub-period 1, the coefficient for *CONF* is -0.855, suggesting that the presence of conflict between two trading partners decreases exports by about 57 percent ($e^{-0.855}$). Similarly, in sub-period 2, sub-period 3, sub-period 4 and sub-period 5, the negative impact of *CONF* is reflected by the decrease in exports between the trading partners by about 46 percent, 53 percent, 46 percent and 49 percent, respectively. Given the scenario of hostility and incessant discord among SAARC members as already discussed above, this result is not surprising.

Of special interest in this regression result is the coefficient for *TRAG*, which is negative and statistically significant at 1 percent level of significance for the sub-period 1 and sub-period 2, insignificant in the sub-period 3, and then positive and highly significant again in the sub-period 4 and sub-period 5. It is quite evident that before SAARC came into existence, intra-regional trade was much lower among the South Asian nations. Even after the inception of SAARC in 1985, the impact is not significant during the sub-period 3. However, the impact of *TRAG* can be clearly observed in the sub-period 4 and sub-period 5, i.e., after the SAPTA came into operation in 1995. For instance, in the case of sub-period 2, which is the period just before SAARC came into force, the coefficient of *TRAG* is -0.994, and the coefficient in sub-period 4, i.e., the period after SAPTA came into operation is 0.573. It implies that even those countries that did have trade agreements had about 63 percent ($e^{-0.994}$) less exports in the sub-period 2. However, in the sub-period 4, exports increased by about 77 percent ($e^{0.573}$). There is a further increase in exports in the sub-period 5 by about 80 percent ($e^{0.587}$). The volume of intra-regional exports for SAARC countries from the period 1980 through 2004 in Table 2 and 3 also corroborate these findings. These results indicate that the impact of trade agreements is time-dependent, which is largely consistent with the findings by Baier and Bergstrand (2005). Moreover, this strongly supports the case for deeper regional economic integration in South Asia.

5.2 Robustness Checks

Thus far, we have found strong support for positive impact of trade agreements on exports. However, one legitimate query that needs to be addressed is how robust our findings are. To check the robustness of the benchmark results, Table 3 through Table 9 presents

estimates of some sensitivity analyses. In so doing, country and time dummies, first differencing, IV technique, and fixed as well as random effects models are tested.

5.2.1 Country Dummy Effects

With the introduction of country dummies in Table 3, *GDP* and *POP* are still strongly associated with exports. The impact of *DREX* is found to be largely insignificant. This may be because almost all SAARC countries follow a fixed exchange rate system and so the depreciation rates among these countries are negligible. As seen in Table 2, the coefficient for *DIST* is positive in the sub-period 1, but negative and significant for the most part, which is typical and as expected. The coefficient for *BORD* turns out to be insignificant and even negative in the sub-period 1 with the inclusion of country dummies. The estranged relationship between India and Pakistan two major countries in the region could yet again explain this phenomenon. Besides, although Bangladesh, Bhutan, and Nepal also share a common border, the gravity effect of these smaller countries have so little impact relative to huge economies of India and Pakistan.

The coefficients for *LANG*, *CURR*, *TRAG* and *CONF* show very similar pattern as illustrated in the benchmark results in Table 2. The interpretations for this are not very different from what has been deliberated above. Nevertheless, a careful scrutiny demonstrates that the positive impact of *TRAG* has slightly weakened in the sub-period 4 and sub-period 5. In this specification, the coefficient of *TRAG* is 0.341 and 0.384. This quantitative estimate suggests that after controlling for individual country effects, the impact of *TRAG* has about 41 percent ($e^{0.341}$) and 47 percent ($e^{0.384}$) increase in exports between country pairs in sub-period 4 and sub-period 5 respectively. On the other hand, *CONF* has a further negative impact on exports, as the exports during the sub-period 4 and sub-period 5 decreased by almost 60 percent ($e^{-0.904}$) and 51 percent ($e^{-0.721}$), respectively. Except for the sub-period 2, *PORT* has a significant impact on exports in the sub-period 3, sub-period 4 and sub-period 5.

Interestingly, economically larger countries, particularly India, Pakistan and Bangladesh did not fare well in sub-period 1, displaying clearly the backlash of the war during the period. Nevertheless, beginning from the sub-period 3, i.e., soon after SAARC came into being, trade volume of these three countries picked up momentum with positive significant impacts on the regressand. As characteristic to gravity effects, small economies like Bhutan, Maldives and Nepal are losers in the game, but it is interesting to note that during the sub-period 1 when all major players were at conflict, only Nepal and Sri Lanka fared well as they continued to have good terms of trade. During the period, *DIST* though positive, is not statistically different from zero, which further justifies this observation.

5.2.2 Time Dummy Effects

Adding time dummies has little material effect on the estimated results as shown in Table 4. However, few points worth mentioning are the insignificant impacts of *DREX* and *BORD*; and the inclusion of lag for *TRAG* has a stronger positive impact especially in the sub-period 5. Inclusion of one lag for *TRAG* has an increased impact on coefficient from 0.466 to 0.491. With two lags, the coefficient value leaped from 0.491 to 0.503.²³ In regards to coefficients of the *CONF* variable, the trend is very similar with significantly negative impacts on exports for all sub-periods, as was also the case in Table 2 and Table 3.

The coefficient for *DIST* is positive and significant during the sub-period 1. The reason is, as described earlier, when the closest neighbors like India, Pakistan and Bangladesh had estranged relations due to war during this period, these countries traded more vigorously with their distant neighbors instead, such as with Sri Lanka and Maldives in order to compensate for trade losses. For instance, Pakistan's exports to Maldives increased threefold, and to Sri Lanka by almost twofold during the sub-period 1 as compared to the sub-period 2. In reciprocation, Sri Lanka's exports to Pakistan increased by more than one and half times during the same period. Bangladesh's exports to Sri Lanka grew by about three times during this period as compared to sub-period 2. Likewise, even India's exports to Sri Lanka and Nepal rose comparatively higher during this period. Conversely, there was virtually no trade or so little trade between India and Pakistan, and Pakistan and Bangladesh during the sub-period 1 until the beginning of the sub-period 2, while trade between the distant partners like Nepal and Sri Lanka were not affected.²⁴

5.2.3 Country and Time Dummy Effects

There is not much variation in the results even after controlling for both country and time dummy effects (see Table 5). In general, we observe that the *TRAG* and *CONF* effects retain similar trend. However, the intensity of *TRAG* effect weakens in comparison to the results in the previous tables.

5.2.4 First Differencing

First differencing is one of many ways to eliminate fixed effects. It is a method where the regressand and the regressors are first-differenced by taking the difference of adjacent time periods, i.e., the earlier time period is subtracted from the later time period. This method is particularly useful when the unobserved factors that change over time are serially correlated. If e_{ijt} follows a random walk, meaning that there is very substantial positive serial correlation,

²³ More simulations on lagged change effects are discussed in the later section under Lagged Effects of *TRAG*.

²⁴ A careful examination of raw data clearly points out this fact.

then the difference Δe_{ijt} is serially uncorrelated, and therefore, first differencing is a good alternative to solve this problem.²⁵

In Table 6, focusing again on the *TRAG* and *CONF* variables, the coefficients retain the expected signs. *TRAG* has a highly significant positive impact on exports in the post-SAARC periods, i.e., in the sub-period 4 and sub-period 5. The estimates suggest that *TRAG* increases partner countries' exports by about 127 percent ($e^{0.819}$) in the sub-period 4 and about 132 percent ($e^{0.840}$) in the sub-period 5. *CONF*, on the other hand, has a negative impact in all periods, and the coefficients are statistically significant from the sub-period 3 through sub-period 6, but the impacts are lesser as compared to the earlier OLS estimates.

5.2.5 IV and 2SLS Estimation

Table 7 provides the results of the estimation using IV. A set of three z variables has been used that is likely to influence the formation of FTA and less likely to be correlated to the error term, e_{ijt} . The method of IV can be used to solve the problem of endogeneity of one or more explanatory variables. This method applies two staged least squares (2SLS or TSLS), which is second in popularity next to OLS for estimating linear equations in applied econometrics.²⁶

Here, we use IV method to solve two kinds of endogeneity problems: omitted variables and measurement error. In the omitted variables case, variables are held fixed when estimating the ceteris paribus effect of one or more of the observed explanatory variables. In the measurement error case, we estimate the effect of certain explanatory variables on the regressand, provided that we have mismeasured one or more variables. In both cases, the parameters of interest can be estimated by OLS. Moreover, the application of IV methods to independently pooled cross sections does not pose much difficulty. As with models estimated by OLS, time period dummy variables can be included to allow for aggregate time effects. These dummy variables are exogenous as time trend is exogenous, and they act as its own instruments. An additional advantage is that IV estimation can be combined with panel data methods, particularly first differencing, to consistently estimate parameters in the presence of unobserved effects and endogeneity in one or more time-varying explanatory variables.

Six different scenarios are tested, and we find that the results obtained by using these z variables do not deviate much from the earlier results. The impact of *TRAG* is still positive and

²⁵ First differencing the panel data yields some potential advantages over fixed effects. See Wooldridge (2003: 467-468) for further details.

²⁶ Wooldridge (2003: 484) notes that an IV must have two properties: (i) it must be exogenous, i.e., uncorrelated with the error term of the structural equation; and (ii) it must be partially correlated with the endogenous explanatory variable.

statistically significant, while the impact of *CONF* is negative and statistically significant. Nevertheless, in specification 5 with the first differencing, *TRAG* has a significant impact on exports yielding an increase in exports by about 125 percent ($e^{0.81}$) and in specification 6 by almost 126 percent ($e^{0.814}$) as analogous to first differencing. Hausman Test is applied to compare the OLS and 2SLS estimates and to determine whether the differences are statistically significant. This procedure tests the null hypothesis (H_0) that the error term e_{ijt} of the OLS and the error term of the 2SLS (say, v_2) are not correlated. The test fails to reject the H_0 concluding the exogeneity of z variables because e_{ijt} and v_2 are not correlated. In addition, the testing of overidentifying restrictions used in the 2SLS suggests that the model is just identified. Thus, the impact of *TRAG* in the last two specifications is consistent and reliable.²⁷ Similar results from the first differencing method further justify consistency of the estimates.

5.2.6 Fixed and Random Effects Models

Table 8 and 9 show estimation results with fixed effects and random effects models. Dummy variables are excluded in both the models to avoid near singular matrix. *F* Test is conducted to test whether the fixed effects coefficients are equal or not by comparing the sum of squared residuals (SSR) from the pooled OLS model and the fixed effects model. The computed *p*-value of zero soundly rejects the H_0 of equal intercepts. In addition, *p*-values of the Hausman Test are essentially zero for almost all periods, and so we reject the H_0 of the random effects model in favor of the fixed effects model.

As in the pooled OLS model, one can also observe that almost all the coefficients of *GDP* and *POP* for both the fixed effects model and random effects model are statistically significant and positive, while the coefficient of *DIST* is statistically significant with a conventional negative coefficient. The coefficient of *DREX* is largely insignificant in the case of both fixed and random effects.

All the same, it is indeed quite impossible to compare statistically the validity and preference for these three models. For basic determination of the results, we consider the OLS and 2SLS estimations, as our principal interest lies in observing the impact of *TRAG* and *CONF* on exports. Moreover, the OLS and 2SLS models embraces all the explanatory variables that are likely to affect exports, and considering exogeneity with country and time fixed effects, first differencing and the use of z variables, the results are consistent. Even

²⁷ Wooldridge (2003: 514) notes that when instruments are poor, which means that they are correlated with the error term, and only weakly correlated with the endogenous explanatory variables or both, 2SLS estimates can be even worse than OLS. However, if the variables are exogenous, then the results of both OLS and 2SLS are consistent.

though we observe quantitative differences among these models, they are not very different in qualitative terms.

Finally, in this paper, the preference for panel estimation is given to fixed effects rather than random effects for two reasons, as also noted by Baier and Bergstrand (2005 : 18). First, it is on conceptual economic grounds that the source of endogeneity bias in the gravity equation is believed to be unobserved heterogeneity. That is, in economic terms there are unobserved effects or time-invariant variables (say, a_{ij}) that influence simultaneously the presence of FTA and volume of exports. These variables are best controlled for using bilateral fixed effects, as such an approach allows for arbitrary correlations of a_{ij} with $TRAG_{ij}$. In contrast, under random effects, no correlation is assumed between unobserved effects a_{ij} with the explanatory variable $TRAG_{ij}$ in each time period, which seems much less likely. Second, recent econometric evaluations of the gravity equation with panel data using the Hausman Test to test for random effects against fixed effects find high evidence for rejection of random effects model relative to fixed effects model.

5.3 Effects of SAPTA

Researchers more often than not have raised debates that SAPTA has not been the main vehicle for enhancing intra-SAARC trade. This contentious argument demands further testing. As we have seen in our earlier tests in Table 2 through Table 7 that the impact of $TRAG$ is mostly seen in the sub-period 4 and sub-period 5, i.e., the period after SAPTA came into operation. This gives high possibility for us to conclude that the major impact on exports could have come about because of the SAPTA, and at the same time, undermine the role of $TRAG$ as such. In order to unravel this myth, three more tests were carried out using $SAPTA$ as one of the dummy regressors as shown in Table 10, 11 and 12. It is fascinating to see that $TRAG$ has a significant impact only during the two periods from 1985-2005 and from 1980-2005. Indeed, the impact of $TRAG$ diminishes as we move backwards to the earlier period, i.e., 1971-2005, and the coefficient rather turns negative though statistically not significant. Similarly, there is a significant impact of $SAPTA$ at 10 percent level of significance during the period from 1985-2005; and as we move backwards in time, $SAPTA$ is also negatively associated with exports especially for those countries that do not have bilateral trade agreements. In other words, the effect of SAPTA is diluted as we move backwards in time. This simply means that the impact of $TRAG$ increased over time during the later periods particularly after the inception of SAPTA. This clearly indicates that SAPTA has been the catalyst for increasing the impact of $TRAG$ on exports in the later periods. However, it may

also be noted that there is a delayed impact of the already existing bilateral trade agreements among SAARC countries, as shown in the following section.

5.4 Lagged Effects of *TRAG*

Table 13 shows the comparative lagged effects of *TRAG* using country and time dummy effects. Adjusting for unobserved heterogeneity using country and time dummy effects provide impressive results. For instance, in specification (1), the impact of *TRAG* after 15 years (i.e. in 2000) from the inception of SAARC in 1985 is about 37 percent increase, which is an increase by 1.37 times. During the same year, the impact of *TRAG* is nearly 58 percent, 52 percent and 59 percent in specification (2), (3) and (4), respectively. However, in 2004, there is a dramatic increase in the *TRAG* effects from about 81 percent in specification (1) to almost 119 percent in specification (2), 121 percent in specification (3) and 128 percent in specification (4). After 19 years, the impact of *TRAG* is more than *twofold* using country and time dummy effects.²⁸ These results are indeed evocative and consistent with the findings by Baier and Bergstrand (2005), wherein their estimates suggest that an FTA on average *doubles* two member countries' bilateral trade after 10 years.²⁹ Understandably, it took nearly two decades for *TRAG* to show reasonably clear impacts, which satisfactorily portrays the slow nature of SAARC's progress in trade integration.

6. Summary and Conclusions

6.1 Summary of Key Findings

This paper estimated a generalized form of gravity model to determine the impact of trade agreements on exports in the SAARC region. The gravity model performed well empirically yielding reasonably precise and good estimates, which are largely consistent with results of the earlier studies employing a gravity model and pooled trade data.

The fundamental question that arose from the results was whether trade agreements have had a significant positive impact on the volume of exports for SAARC countries. The answer is definitely 'yes', but one should interpret it carefully as the results are suggestive. This is because the empirical tests have found no evidence of the impact of trade agreements on exports in pre-SAARC I (sub-period 1 from 1971 to 1979), pre-SAARC II (sub-period 2 from 1980 to 1984), and SAARC I (sub-period 3 from 1985 to 1995). However, a significant

²⁸ One caveat is that this percentage increase measures only the cumulative effect of *TRAG* on volume of exports. In other words, it is only that part of the role played by *TRAG* in enhancing exports, among many other variables. One should not confuse with an overall increase in the volume of intra-SAARC exports.

²⁹ Using panel data, Rose (2004) estimated an ATE of FTA using fixed effects and found $e^{0.94}$ or 156 percent, while Tomz (2004) estimated the FTA effect of $e^{0.76}$ or 114 percent.

positive impact of trade agreements on exports is observed in SAARC II or post-SAPTA period (sub-period 4 from 1996 to 2005) and for SAARC I+II (sub-period 5 from 1985 to 2005). The phenomenon is observable irrespective of which estimation methods are applied. Thus, the results clearly indicate positive benefits of having trade agreements and preferential arrangements among SAARC countries; although one must reckon that there is a time lag for actual effects to transpire.

The next important question was to ascertain whether the signing of the SAPTA has helped to promote intra-SAARC trade. It is evident that there is a significant positive impact of trade agreements on exports in the post-SAPTA period vis-à-vis the pre-SAPTA period, which clearly signals the catalytic role played by SAPTA in enhancing trade. Furthermore, the test results show that the actual impact seemed to have emanated not entirely from the signing of the SAPTA per se, but the overall impact is rather the combined effect arising from the delayed impact of the existing trade agreements.

6.2 Concluding Remarks

This study strongly supports the case for FTAs and further trade integration among SAARC member nations, clearly signaled by the positive impact of *TRAG* seen in the post-SAPTA period. One can become more optimistic as SAFTA matures through further dismantling of both tariff and non-tariff barriers. There are undoubtedly good prospects for SAFTA to boost up exports, diversify investment and integrate trade. This would, however, need concerted efforts of the member nations to mitigating incidence of conflict, evolving new comparative advantages and complementarities, aggregating with regional blocs, and eliminating any existing impediments to expansion of intra-regional trade with right perspective and affirmative political will. Besides, SAARC should take a more holistic and forward-looking approach to attain the goal of outshining post-SAFTA benefits by including deeper forms of integration in other trade facilitation measures, such as services, energy institutional and infrastructure development, and investment cooperation.

Notwithstanding, the scope of this paper was solely to determine the impacts of some specific variables of interest and evidencing results from within the SAARC bloc. The model was kept simple using widely accepted techniques and conventional empirical methodology. Future work could aim to widen and customize models with more contemporary techniques. It might also be interesting to consider addressing the welfare implications of trade integration, and exploring the relevance and potential for pan-Asian economic cooperation. Another area is to investigate the effects of changing scenario in SAARC's future membership and new perspectives. Finally, while the focus of this paper was mainly to see the impact of trade

agreements on exports, other fitting macroeconomic variables affecting human development, such as education, health, gender issues, environment, etc. could well be considered. This is only a beginning for further probing.

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Table 1: Regression Design

Regression Group	Period (Year)		Countries Included
	Pre-SAARC Period		
1	Pre-SAARC I	(1971 – 1979)	5 countries: Bangladesh, India, Nepal, Pakistan, Sri Lanka
2	Pre-SAARC II	(1980 – 1984)	7 countries: Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka
	Post-SAARC Period		
3	SAARC I (or Pre-SAPTA)	(1985 – 1995)	7 countries: Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka
4	SAARC II (or Post-SAPTA)	(1996 – 2005)	7 countries: Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka
5	SAARC I+II	(1985 – 2005)	7 countries: Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka

Table 2: Gravity Equation Estimates for Pooled OLS Data Model (Benchmark)Regressand: $\ln(X_{ijt})$

Specification	Sub-period 1	Sub-period 2	Sub-period 3	Sub-period 4	Sub-period 5
	Pre-SAARC I	Pre-SAARC II	SAARC I or Pre-SAPTA	SAARC II or Post-SAPTA	SAARC I+II
Regressors	(1971-1979)	(1980-1984)	(1985-1995)	(1996-2005)	(1985-2005)
$\ln(GDP_{jt})$	2.508*** (4.678)	1.844*** (11.858)	1.825*** (25.099)	2.226*** (24.477)	1.738*** (29.282)
$\ln(POP_{jt})$	2.906*** (4.570)	2.374*** (8.843)	1.773*** (15.534)	1.542*** (11.988)	1.434*** (15.058)
$\ln(DREX_{ijt})$	1.994*** (3.042)	0.652 (0.995)	0.449 (0.205)	1.191*** (2.295)	1.473*** (3.497)
$\ln(DIST_{ij})$	1.593* (1.852)	-2.632*** (-2.728)	-3.654*** (-9.207)	-4.518*** (-10.886)	-3.416*** (-11.070)
$BORD_{ij}$	0.771 (1.369)	0.610 (1.515)	0.277* (1.709)	0.367*** (2.109)	0.407*** (3.147)
$LANG_{ij}$	1.652 (1.567)	-2.173* (-1.722)	-2.126 (-1.573)	-1.451 (-1.238)	-1.546* (-1.848)
$CURR_{ijt}$		2.997*** (4.404)	2.399*** (6.894)	2.143*** (8.989)	2.022*** (8.614)
$TRAG_{ijt}$	-0.391*** (-3.305)	-0.994*** (-2.007)	0.135 (0.733)	0.573*** (3.865)	0.587*** (5.109)
$CONF_{ijt}$	-0.855*** (-4.015)	-0.614*** (-6.091)	-0.746** (-2.102)	-0.607** (-1.988)	-0.674** (-2.451)
$MEMB_{ijt}$	0.027 (0.043)	-0.881*** (-2.047)	-1.193*** (-7.053)	-0.811*** (-3.977)	-0.843*** (-5.708)
$LLOCK_{ij}$	0.615 (0.719)	-3.006*** (-3.721)	-0.301 (-0.825)	-1.061*** (-2.639)	-0.383 (-1.285)
$ILAND_{ij}$	0.458 (0.573)	0.708 (1.051)	0.043 (0.136)	0.138 (0.504)	-0.047 (-0.204)
$PORT_{ij}$		-1.882*** (-3.762)	3.099*** (14.486)	2.017*** (8.590)	2.605*** (14.556)
Constant	-59.191*** (-4.795)	-24.270*** (-5.555)	-20.548*** (-14.312)	-20.569*** (-12.896)	-18.586*** (-14.913)
Observations	180	210	462	420	882
RMSE	2.228	2.047	1.300	1.375	1.407
R^2	0.498	0.670	0.813	0.800	0.769

Note: Numbers in parenthesis are t-statistics. *, ** and *** indicate statistical significance at 10%, 5% and 1%, respectively.

Table 3: Pooled OLS with Country Dummy EffectsRegressand: $\ln(X_{ijt})$

Specification	Sub-period 1	Sub-period 2	Sub-period 3	Sub-period 4	Sub-period 5
Regressors	Pre-SAARC Period I (1971-1979)	Pre-SAARC Period II (1980-1984)	SAARC Period I (1985-1995)	SAARC Period II (1996-2005)	SAARC Period I+II (1985-2005)
$\ln(GDP_{jt})$	1.989*** (4.085)	1.898*** (11.958)	1.875*** (24.058)	2.372*** (24.514)	1.893*** (29.878)
$\ln(POP_{jt})$	1.076*** (5.616)	1.010 (1.035)	-1.129** (-1.959)	1.773*** (3.112)	1.416*** (6.080)
$\ln(DREX_{ijt})$	0.646 (0.944)	2.869 (-0.514)	0.282 (0.127)	0.070 (-0.017)	0.244 (0.129)
$\ln(DIST_{ij})$	0.942 (1.605)	-0.878*** (-2.992)	-0.732*** (-9.596)	-0.791*** (-12.643)	-0.642*** (-12.168)
$BORD_{ij}$	-0.471 (-0.865)	0.637 (1.368)	0.132 (0.722)	0.067 (0.324)	0.093 (0.595)
$LANG_{ij}$	1.302 (1.475)	-2.232*** (-3.731)	-2.102*** (-8.607)	-1.332*** (-4.815)	-1.594*** (-8.264)
$CURR_{ijt}$		2.619*** (4.981)	2.540*** (6.486)	2.226*** (7.178)	2.397*** (9.183)
$TRAG_{ijt}$	-0.864*** (-4.267)	-0.863** (-1.726)	-0.003 (-0.018)	0.341*** (2.121)	0.384*** (3.398)
$CONF_{ijt}$	-0.753*** (-4.040)	-0.722*** (-6.743)	-0.789*** (-10.788)	-0.904*** (-11.513)	-0.721*** (-12.060)
$PORT_{ij}$		-2.550*** (-5.258)	3.223*** (12.603)	1.837*** (5.797)	2.752*** (13.317)
Bhutan		-3.963 (-1.315)	-5.485*** (-2.347)	-2.978*** (-3.675)	-4.797*** (-7.306)
India	-3.120*** (-5.221)	4.033 (1.302)	4.700*** (2.894)	5.149*** (4.043)	6.531*** (7.909)
Maldives		-3.169 (-1.187)	-1.864*** (-2.467)	-6.139*** (-3.452)	-7.571*** (-7.237)
Nepal	6.602*** (5.306)	-3.430 (-1.582)	-1.860 (-1.303)	-7.670*** (-3.610)	-4.151*** (-5.457)
Pakistan	0.1670 (0.296)	1.585*** (3.195)	1.168*** (6.911)	1.321*** (6.041)	1.0339*** (7.016)
Sri Lanka	2.544*** (5.291)	-2.576 (-1.095)	-3.935*** (-2.696)	-3.280*** (-3.521)	-5.636*** (-7.367)
Constant	-32.336*** (-6.030)	89.520 (0.974)	17.271 (1.197)	61.898*** (2.682)	35.106*** (4.755)
Observations	180	210	462	420	882
RMSE	2.070	2.027	1.219	1.334	1.353
R^2	0.569	0.682	0.817	0.813	0.788

Note: Numbers in parenthesis are t-statistics. *, ** and *** indicate statistical significance at 10%, 5% and 1%, respectively.

Table 4: Pooled OLS with Time Dummy EffectsRegressand: $\ln(X_{ijt})$

Specification	Sub-period 1	Sub-period 2	Sub-period 3	Sub-period 4	Sub-period 5
Regressors	Pre-SAARC Period I (1971-1979)	Pre-SAARC Period II (1980-1984)	SAARC Period I (1985-1995)	SAARC Period II (1996-2005)	SAARC Period I+II (1985-2005)
$\ln(GDP_{jt})$	2.023*** (4.097)	1.853*** (11.997)	1.854*** (25.262)	2.278*** (25.370)	1.871*** (31.572)
$\ln(POP_{jt})$	2.297*** (3.652)	2.362*** (8.807)	1.803*** (16.023)	1.641*** (12.447)	1.603*** (17.204)
$\ln(DREX_{ijt})$	0.711 (0.100)	1.762 (0.335)	0.425 (0.196)	1.6378 (0.435)	0.531 (0.285)
$\ln(DIST_{ij})$	2.988 (1.637)	-2.658*** (-2.753)	-3.713*** (-9.329)	-4.590*** (-11.205)	-3.633*** (-11.761)

<i>BORD_{ij}</i>	-0.499 (-0.897)	0.640 (1.584)	0.248 (1.559)	0.244 (1.363)	0.210 (1.608)
<i>LANG_{ij}</i>	1.329 (1.498)	-2.204*** (-3.787)	-2.156*** (-8.712)	-1.435*** (-5.250)	-1.636*** (-8.545)
<i>CURR_{ijt}</i>		-3.005*** (-4.424)	2.443*** (7.119)	2.257*** (9.139)	2.303*** (10.057)
<i>TRAG_{ijt}</i>	-2.829*** (-4.251)	-0.985** (-1.982)	0.110 (0.602)	0.496*** (3.373)	0.466*** (4.210)
<i>TRAG_{ijt-1}</i>	-2.693*** (-4.192)	-1.075* (-1.939)	0.145 (0.757)	0.492*** (3.138)	0.491*** (4.348)
<i>TRAG_{ijt-2}</i>	-3.070*** (-4.736)	-0.990 (-1.569)	0.150 (0.744)	0.484*** (2.879)	0.503*** (4.360)
<i>CONF_{ijt}</i>	-0.759*** (-4.029)	-0.620*** (-6.213)	-0.760*** (-10.300)	-0.827*** (-10.978)	-0.705*** (-11.392)
<i>MEMB_{ijt}</i>	0.268 (0.461)	-0.927*** (-2.153)	-1.216 (-7.243)	-0.818*** (-4.0639)	-0.945*** (-6.663)
<i>LLOCK_{ij}</i>	0.688 (0.861)	-3.049*** (-3.761)	0.317 (0.880)	-0.944*** (-2.347)	-0.179 (-0.631)
<i>ILAND_{ij}</i>	0.132 (0.166)	0.716 (1.062)	0.063 (0.202)	0.271 (0.987)	0.119 (0.548)
<i>PORT_{ij}</i>		-1.893*** (-3.763)	3.099*** (14.714)	2.064*** (8.8390)	2.655*** (15.860)
Constant	-17.982*** (-5.260)	27.691 (1.255)	14.374*** (2.249)	19.083*** (3.434)	11.010 (6.652)
Observations	180	210	462	420	882
RMSE	2.101	2.042	1.220	1.352	1.357
<i>R</i> ²	0.556	0.674	0.816	0.807	0.786

Note: Numbers in parenthesis are t-statistics. *, ** and *** indicate statistical significance at 10%, 5% and 1%, respectively.

Table 5: OLS with Country and Time Dummy Effects

Regressand: $\ln(X_{ijt})$

Specification	Sub-period 1	Sub-period 2	Sub-period 3	Sub-period 4	Sub-period 5
Regressors	Pre-SAARC Period I (1971-1979)	Pre-SAARC Period II (1980-1984)	SAARC Period I (1985-1995)	SAARC Period II (1996-2005)	SAARC Period I+II (1985-2005)
$\ln(GDP_{jt})$	1.992*** (4.095)	1.835*** (11.341)	1.878*** 24.034	0.097*** (24.395)	1.896*** (29.596)
$\ln(POP_{it})$	3.700*** (2.695)	1.074** (1.988)	0.132*** (2.980)	1.042*** (4.032)	2.066*** (2.351)
$\ln(DREX_{ijt})$	0.655 (0.952)	2.778 (0.495)	0.325 (0.147)	0.076 (0.066)	0.262 (0.138)
$\ln(DIST_{ij})$	2.945 (1.606)	-2.330*** (-2.478)	-3.738*** (-9.609)	-0.380*** (-12.611)	-3.648*** (-12.094)
<i>BORD_{ij}</i>	-0.472 (-0.864)	0.872* (1.915)	0.128 (0.702)	0.206 (-0.314)	0.087 (0.557)
<i>LANG_{ij}</i>	1.303 (1.474)	-2.153*** (-3.579)	-2.104*** -8.610	0.277*** (-4.810)	-1.596*** (-8.260)
<i>CURR_{ijt}</i>		-3.580*** (-4.705)	2.543*** (6.478)	0.311*** (7.158)	2.402*** (9.151)
<i>TRAG_{ijt}</i>	-2.861*** (-4.269)	-0.789 (-1.566)	-0.005 (-0.030)	0.161*** (2.124)	0.381*** (3.339)
<i>CONF_{ijt}</i>	-0.754*** (-4.047)	-0.692*** (-6.749)	-0.790*** (-10.764)	0.079*** (-11.501)	-0.722*** (-11.965)
<i>MEMB_{ijt}</i>	-2.766*** (-2.561)	-2.803 (-0.065)	-3.470 (-0.5470)	-3.669*** (-2.378)	-3.172 (-1.437)
<i>LLOCK_{ij}</i>			3.220*** (12.567)	0.318*** (5.771)	2.750*** (13.335)
<i>TREND</i>	-0.018 (-0.126)	-0.111 (-0.191)	-0.077 (-0.853)	0.050 (0.390)	-0.015 (-0.492)
<i>BTN</i>		-4.590	-3.262	-4.459***	-3.636*

		(-1.052)	(-0.253)	(-2.345)	(-1.929)
<i>IND</i>	-4.589***	3.791***	1.915***	4.520***	5.313**
	(-2.538)	(2.070)	(3.244)	(2.539)	(1.956)
<i>MDV</i>		-4.716	-4.149	-9.751***	-10.805*
		(-0.041)	(-0.247)	(-2.185)	(-1.8410)
<i>PAK</i>	-7.577***	4.253	-2.418	3.853***	4.172*
	(-2.555)	(0.098)	(-0.373)	(2.621)	(1.824)
<i>LKA</i>	7.718***	-1.326	1.776	4.211***	-4.545*
	(2.518)	(-0.030)	(0.262)	(-2.259)	(-1.852)
Constant	-27.799	16.926	15.877	26.293	50.298
	(-1.424)	(0.290)	(0.970)	(0.367)	(1.2870)
Observations	180	210	462	420	882
RMSE	2.076	2.056	1.219	1.336	1.353
R^2	0.569	0.673	0.818	0.813	0.788

Note: Numbers in parenthesis are t-statistics. *, ** and *** indicate statistical significance at 10%, 5% and 1%, respectively.

Table 6: First-Differenced Gravity Equation Estimates

Regressand: $\ln(X_{ijt})$

Specification	Sub-period 1	Sub-period 2	Sub-period 3	Sub-period 4	Sub-period 5
Regressors	Pre-SAARC Period I (1971-1979)	Pre-SAARC Period II (1980-1984)	SAARC Period I (1985-1995)	SAARC Period II (1996-2005)	SAARC Period I+II (1985-2005)
$\ln(GDP_{jt})$	4.083***	1.724***	1.531***	1.889***	1.288***
	(3.374)	(4.675)	(6.282)	(6.102)	(5.367)
$\ln(POP_{it})$	0.759***	0.530*	0.701***	0.338***	0.852**
	(2.143)	(1.714)	(3.221)	(2.514)	(1.969)
$\ln(DREX_{ijt})$	1.444***	4.511*	0.390	2.099***	0.430
	(2.613)	(1.895)	(0.548)	(2.638)	(0.534)
$\ln(DIST_{ij})$	0.758	-2.067	-3.111***	-4.666***	-2.723*
	(0.682)	(-1.058)	(-2.585)	(-2.931)	(-1.854)
$BORD_{ij}$	-2.148*	0.564	0.784	1.561***	2.096***
	(-1.887)	(0.372)	(0.880)	(2.2260)	(2.768)
$LANG_{ij}$	3.164	-0.970	-1.351*	-1.598***	-1.428*
	(0.934)	(-1.197)	(-1.762)	(-2.4360)	(-1.771)
$CURR_{ijt}$		0.290	0.442***	0.511***	0.137***
		(0.359)	(3.424)	(2.540)	(2.146)
$TRAG_{ijt}$	-0.458	-1.860*	0.698	0.819***	0.840***
	(-0.243)	(-1.716)	(1.178)	(3.765)	(2.869)
$CONF_{ijt}$	-0.706	-0.321	-0.661***	-0.687***	-0.535***
	(-1.592)	(-0.648)	(-2.235)	(-3.059)	(-2.930)
$MEMB_{ijt}$	1.249	-3.874*	-2.917***	-1.814	-2.577*
	(0.872)	(-1.907)	(-2.381)	(-1.372)	(-1.847)
$LLOCK_{ij}$	0.019	-6.691***	-3.561**	-3.409***	-3.196***
	(0.047)	(-3.169)	(-1.972)	(-3.158)	(-2.112)
$ILAND_{ij}$	0.462	0.924*	0.972	0.064	0.510
	(1.529)	(1.829)	(1.067)	(0.530)	(1.319)
$PORT_{ij}$		-2.220	2.223***	1.887**	3.220***
		(-0.852)	(2.150)	(1.965)	(5.878)
Constant	0.198	0.051	0.013	0.011	0.006
	(0.996)	(0.458)	(0.377)	(0.221)	(0.202)
Observations	180	210	462	420	882
RMSE	2.290	1.610	0.754	1.045	0.836
R^2	0.320	0.570	0.622	0.541	0.447

Note: Numbers in parenthesis are t-statistics. *, ** and *** indicate statistical significance at 10%, 5% and 1%, respectively.

Table 7: Gravity Equation Estimates using IV (1996-2005)Regressand: $\ln(X_{ijt})$

Specification	(1)	(2)	(3)	(4)	(5)	(6)
Regressors	With no Country and Time Dummies	With Country Dummies	With Time Dummies	With Country and Time Dummies	With First Differencing and Time Dummies	With First Differencing and no Time Dummies
$\ln(GDP_{jt})$	2.226*** (24.477)	2.372*** (23.549)	2.278*** (23.620)	2.371*** (23.493)	1.895*** (6.167)	1.889*** (6.102)
$\ln(POP_{it})$	1.542*** (11.988)	-8.773*** (-3.552)	1.641*** (11.731)	-10.246*** (-2.042)	-0.315 (-0.474)	-0.338 (-0.514)
$\ln(DREX_{ijt})$	7.191*** (2.295)	-0.070 (-0.0170)	-1.638 (-0.407)	0.268 (0.063)	5.780*** (2.457)	6.099*** (2.638)
$\ln(DIST_{ij})$	-4.518*** (-10.886)	-4.791*** (-11.669)	-4.590*** (-11.203)	-4.788*** (-11.650)	-4.702*** (-2.948)	-4.666*** (-2.931)
$BORD_{ij}$	0.367*** (2.109)	-0.067 (-0.2100)	0.244 (0.812)	-0.065 (-0.204)	1.550*** (2.210)	1.561*** (2.226)
$LANG_{ij}$	-1.451*** (-5.238)	-1.332*** (-5.252)	-1.435*** (-5.645)	-1.332*** (-5.245)	-1.607*** (-2.456)	-1.598*** (-2.436)
$CURR_{ijt}$	2.143*** (8.989)	2.225*** (5.040)	2.257*** (5.212)	2.223*** (5.031)	0.514 (0.537)	0.511 (0.540)
$TRAG_{ijt}$	0.573*** (3.865)	0.341* (1.783)	0.496*** (2.726)	0.342* (1.786)	0.810* (1.779)	0.814* (1.765)
$CONF_{ijt}$	-0.807*** (-10.658)	-0.904*** (-8.239)	-0.827*** (-7.672)	-0.904*** (-8.226)	-0.691*** (-3.079)	-0.687*** (-3.059)
$MEMB_{ijt}$	-0.811*** (-3.977)	-1.321*** (-4.9160)	-0.818*** (-3.863)	-1.372*** (-4.445)	1.775 (1.343)	1.814 (1.372)
$LLOCK_{ij}$	-1.061*** (-2.639)	-8.991*** (-4.522)	-0.944 (-1.643)	-10.097*** (-2.633)	-3.433*** (-3.231)	-3.409*** (-3.158)
$ILAND_{ij}$	0.138 (0.504)	-27.460*** (-4.114)	0.271 (0.8470)	-31.400*** (-2.334)	-4.044*** (-2.528)	-4.064*** (-2.530)
$PORT_{ij}$	2.017*** (8.590)	1.837*** (3.567)	2.064*** (4.162)	1.837*** (3.565)	1.862 (1.465)	1.887 (1.465)
Constant	-20.569*** (-12.896)	63.219*** (3.126)	19.083*** (3.400)	36.390 (0.443)	-23.886 (-0.631)	0.011 (0.221)
Observations	420	420	420	420	420	420
RMSE	1.375	1.334	1.353	1.336	1.046	1.045
R^2	0.800	0.813	0.807	0.813	0.542	0.541

Note: Numbers in parenthesis are t-statistics. *, ** and *** indicate statistical significance at 10%, 5% and 1%, respectively.

Table 8: Fixed Effects ModelRegressand: $\ln(X_{ijt})$

Specification	Sub-period 1	Sub-period 2	Sub-period 3	Sub-period 4	Sub-period 5
Regressors	Pre-SAARC Period I (1971-1979)	Pre-SAARC Period II (1980-1984)	SAARC Period I (1985-1995)	SAARC Period II (1996-2005)	SAARC Period I+II (1985-2005)
$\ln(GDP_{jt})$	1.086*** (3.709)	0.983*** (2.954)	0.036*** (2.453)	1.912* (1.808)	0.270*** (3.590)
$\ln(POP_{it})$	5.837*** (5.237)	9.151* (1.910)	2.653*** (3.826)	7.999*** (2.413)	0.228*** (3.275)
$\ln(DREX_{ijt})$	0.403 (0.754)	0.905* (1.935)	0.359 (0.555)	0.252 (0.098)	0.206 (0.248)
$\ln(DIST_{ij})$	2.561*** (8.541)	-2.078*** (-2.144)	-0.851*** (-3.331)	-2.132*** (-2.301)	-0.146*** (-3.675)
Observations	180	210	462	420	882
RMSE	1.822	0.914	0.400	0.958	0.789
R^2	0.688	0.945	0.982	0.911	0.930

Note: Numbers in parenthesis are t-statistics. *, ** and *** indicate statistical significance at 10%, 5% and 1%, respectively.

Table 9: Random Effects Model

Regressand: $\ln(X_{ijt})$					
Specification	Sub-period 1	Sub-period 2	Sub-period 3	Sub-period 4	Sub-period 5
	Pre-SAARC	Pre-SAARC	SAARC Period	SAARC Period	SAARC Period
Regressors	Period I	Period II	I	II	I+II
	(1971-1979)	(1980-1984)	(1985-1995)	(1996-2005)	(1985-2005)
$\ln(GDP_{jt})$	2.760*** (3.424)	1.251*** (4.032)	0.306*** (2.890)	1.316*** (4.079)	0.252*** (2.896)
$\ln(POP_{jt})$	2.774*** (3.278)	1.753*** (5.467)	1.303*** (5.706)	1.255*** (4.869)	0.987*** (4.553)
$\ln(DREX_{ijt})$	1.952*** (4.134)	1.453*** (2.217)	0.290 (0.384)	0.302 (0.842)	1.318 (1.165)
$\ln(DIST_{ij})$	3.749** (1.691)	-0.932*** (-2.217)	-0.370 (-0.365)	-1.209 (-1.135)	-0.843 (-0.864)
Constant	-61.725*** (-4.013)	-29.430*** (-4.678)	-11.911*** (-3.069)	-19.463*** (-3.684)	-7.648*** (-2.086)
Observations	180	210	462	420	882
RMSE	1.931	0.835	0.386	0.937	0.774
R^2	0.607	0.943	0.981	0.905	0.930

Note: Numbers in parenthesis are t-statistics. *, ** and *** indicate statistical significance at 10%, 5% and 1%, respectively.

Table 10: Gravity Equation Estimates using OLS (7 countries)

Regressand: $\ln(X_{ijt})$			
Specification	(1)	(2)	(3)
	Countries with Trade	Countries without Trade	Countries with and without
Regressors	Agreements	Agreements	Agreements
	(1985-2005)	(1985-2005)	(1985-2005)
$\ln(GDP_{jt})$	1.388*** (14.008)	1.564*** (15.940)	1.683*** (27.311)
$\ln(POP_{jt})$	1.167*** (10.565)	0.899*** (8.220)	1.553*** (16.510)
$\ln(DREX_{ijt})$	2.595* (1.657)	3.566 (1.615)	2.348 (1.279)
$\ln(DIST_{ij})$	-0.667* (-1.689)	-6.968*** (-20.060)	-4.190*** (-13.660)
$BORD_{ij}$	0.463*** (3.963)	-0.366 (-1.035)	-0.792*** (-4.833)
$LANG_{ij}$	-0.747*** (-3.726)	-1.897*** (-8.480)	-1.607*** (-8.451)
$CURR_{ijt}$	1.053*** (5.192)		3.145*** (12.952)
$TRAG_{ijt}$			0.558*** (4.729)
$CONF_{ijt}$	-0.422*** (-5.126)	-1.731*** (-9.414)	-1.326** (-1.977)
$MEMB_{ijt}$	0.280 (1.537)	-1.027*** (-6.249)	-1.113*** (-7.479)
$LLOCK_{ij}$	1.405*** (6.737)		-0.518* (-1.840)
$ILAND_{ij}$	-0.604*** (-2.555)	-1.703*** (-5.677)	0.255 (1.157)
$PORT_{ij}$	2.173*** (11.264)	5.118*** (20.882)	2.032*** (10.886)
$SAPTA_{ijt}$	0.114* (1.728)	-0.842*** (-6.202)	-0.633 (-1.363)
Constant	-21.962*** (-11.647)	-2.108 (-1.111)	-15.455*** (-12.145)
Observations	420	462	882
RMSE	0.724	1.342	1.371

R^2	0.665	0.838	0.782
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Note: Numbers in parenthesis are t-statistics. *, ** and *** indicate statistical significance at 10%, 5% and 1%, respectively.

Impact of SAPTA

Countries with *TRAG*: Significant at 10% level of significance, $e^{0.114} = 12.08\%$.

Countries without *TRAG*: Significant at 1% level of significance, $e^{-0.842} = -56.92\%$.

With and without *TRAG*: Not Significant, but negative coefficient.

Impact of TRAG

Significant at 1% level of significance, $e^{0.558} = 74.72\%$.

Table 11: Gravity Equation Estimates using OLS (7 countries)

Regressand: $\ln(X_{ijt})$			
Specification	(1)	(2)	(3)
	Countries with Trade	Countries without Trade	Countries with and without
Regressors	Agreements	Agreements	Agreements
	(1980-2005)	(1980-2005)	(1980-2005)
$\ln(GDP_{jt})$	1.984*** (11.941)	1.664*** (17.019)	1.827*** (28.035)
$\ln(POP_{it})$	1.798*** (8.024)	1.123*** (9.073)	1.708*** (16.843)
$\ln(DREX_{ijt})$	2.979 (1.191)	4.317* (1.783)	2.282 (1.143)
$\ln(DIST_{ij})$	0.080*** (0.121)	-5.944*** (-17.405)	-3.396*** (-10.734)
$BORD_{ij}$	0.044 (0.252)	-0.719** (-2.167)	0.393*** (2.984)
$LANG_{ij}$	-0.244 (-0.896)	-2.246*** (-10.535)	-1.767*** (-9.351)
$CURR_{ijt}$	0.417 (1.014)		1.061*** (2.566)
$TRAG_{ijt}$			0.406*** (2.985)
$CONF_{ijt}$	-0.701*** (-6.633)	-1.159*** (-7.819)	-0.641*** (-11.900)
$MEMB_{ijt}$	0.464 (1.555)	-1.078*** (-5.778)	-0.930*** (-6.485)
$LLOCK_{ij}$	1.539** (2.508)		-0.625 (-1.152)
$ILAND_{ij}$	-0.522 (-1.147)	-1.332*** (-4.278)	0.213 (0.936)
$PORT_{ij}$	2.342*** (4.073)	4.738*** (18.485)	1.938*** (4.039)
$SAPTA_{ijt}$	0.094 (0.804)	-0.792*** (-5.600)	-0.474 (-1.375)
Constant	-35.909*** (-10.492)	-7.941*** (-4.309)	-20.602*** (-14.609)
Observations	520	572	1092
RMSE	1.467	1.523	1.689
R^2	0.490	0.794	0.702

Note: Numbers in parenthesis are t-statistics. *, ** and *** indicate statistical significance at 10%, 5% and 1%, respectively.

Impact of SAPTA

Countries with *TRAG*: Not Significant, but $e^{0.094} = 9.86\%$.

Countries without *TRAG*: Significant at 1% level of significance, $e^{-0.792} = -54.71\%$.

With and without *TRAG*: Not Significant, but negative coefficient.

Impact of TRAG

Significant at 1% level of significance, $e^{0.406} = 50.08\%$.

Table 12: Gravity Equation Estimates using OLS (5 countries)Regressand: $\ln(X_{ijt})$

Specification	(1)	(2)	(3)
	Countries with Trade	Countries without Trade	Countries with and without
Regressors	Agreements	Agreements	Agreements
	(1971-2005)	(1971-2005)	(1971-2005)
$\ln(GDP_{jt})$	2.413*** (13.662)	2.902*** (3.528)	1.771*** (11.949)
$\ln(POP_{it})$	3.185*** (11.961)	3.315*** (3.951)	2.696*** (13.124)
$\ln(DREX_{ijt})$	1.470* (1.908)	3.772*** (4.912)	2.148*** (3.483)
$\ln(DIST_{ij})$	-0.253 (-0.244)	29.617* (1.757)	1.539*** (2.943)
$BORD_{ij}$	0.085 (0.412)	11.263 (1.588)	-0.090 (-0.379)
$LANG_{ij}$	-0.121 (-0.289)		0.539*** (2.694)
$TRAG_{ijt}$			-0.557 (-0.352)
$CONF_{ijt}$	-0.786*** (-5.830)	-0.231 (-1.588)	-0.638*** (-6.665)
$MEMB_{ijt}$	-0.831** (-2.346)	-0.827** (-2.366)	-0.309* (-1.804)
$LLOCK_{ij}$			
$ILAND_{ij}$	0.919* (1.914)	1.386*** (2.910)	1.324*** (4.520)
$PORT_{ij}$	0.733** (2.497)		-0.201 (-0.759)
$SAPTA_{ijt}$	-0.348*** (-2.823)	-0.946*** (-3.364)	-0.252*** (-2.904)
Constant	-48.112*** (-10.378)	-152.779*** (-2.206)	-43.249*** (-14.815)
Observations	455	210	700
RMSE	1.421	1.410	1.480
R^2	0.600	0.463	0.505

Note: Numbers in parenthesis are t-statistics. *, ** and *** indicate statistical significance at 10%, 5% and 1%, respectively.

Impact of SAPTA

Countries with TRAG: Significant at 1% level of significance, $e^{-0.348} = -29.39\%$.

Countries without TRAG: Significant at 1% level of significance, $e^{-0.946} = -61.17\%$.

With and without TRAG: Significant at 1% level of significance, $e^{-0.252} = -22.28\%$.

Impact of TRAG

Significant at 1% level of significance, $e^{-0.557} = -42.71\%$.

Table 13: Comparative Lagged Effects of TRAG

Specification	(1)		(2)		(3)		(4)	
	With no Country and Time Dummies (1985-2005)		With Country Dummies (1985-2005)		With Time Dummies (1985-2005)		With Country and Time Dummies (1985-2005)	
Year	% Increase	No. of Times Increase	% Increase	No. of Times Increase	% Increase	No. of Times Increase	% Increase	No. of Times Increase
1986	4.73	1.05	6.19	1.06	6.79	1.07	6.21	1.80
1987	6.07	1.06	9.46	1.09	10.00	1.10	9.51	1.10
1990	15.75	1.16	22.86	1.23	27.27	1.27	23.68	1.24
1995	40.99	1.41	55.39	1.55	65.54	1.66	57.1	1.57
2000	36.67	1.37	57.66	1.58	52.45	1.52	58.59	1.59
2004	81.85	1.82	118.72	2.19	121.37	2.21	127.84	2.28

Note: The base year is 1985.

Appendix 1: Exposition of South Asia Preferential Trade Arrangement (SAPTA)

In December 1991, the Sixth Summit held in Colombo approved the establishment of an Inter-Governmental Group (IGG) to formulate an agreement to establish a SAARC Preferential Arrangement (SAPTA) by 1997. Given the consensus within SAARC, the Agreement on SAPTA was signed in Dhaka on April 11, 1993 and entered into force on December 7, 1995.

The SAPTA envisages to establish and promote regional preferential trading arrangement for strengthening intraregional economic cooperation and the development of national economies of the seven member states of the SAARC, namely, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.

Objective

The objective of the SAPTA is to promote and sustain mutual trade and the economic cooperation among the member states through exchange of trade concessions. SAPTA therefore is the first step towards higher levels of trade and economic cooperation in the region.

Principles

The basic principles underlying SAPTA are:

- Overall reciprocity and mutuality of advantages so as to benefit equitably all Contracting States, taking into account their respective level of economic and industrial development, the pattern of their external trade, and trade and tariff policies and systems;
- Negotiation of tariff reform step-by-step, improved and extended in successive stages through periodic reviews;
- Recognition of the special needs of the Least Developed Contracting States and agreement on concrete preferential measures in their favor; and
- Inclusion of all products, manufactures and commodities in their raw, semi-processed and processed forms.

Components

SAPTA has four main components:

- Tariff
- Paratariff
- Nontariff
- Direct Trade Measures.

National Schedules of Concessions

The process of negotiation on the schedule of concession, which forms an integral part of the Agreement, commenced in 1993. For this purpose, the Inter-Governmental Group (IGG) on Trade Liberalization was set up. The IGG met on six occasions in various capitals. At the sixth meeting held in Katmandu on April 20 and 21, 1995, the delegations held intensive rounds of bilateral and multilateral negotiations and agreed on the National Schedule of concessions to be granted by individual member states to other member states under the SAPTA Agreement.

The finalization of National Schedules of Concessions represents a modest but encouraging beginning. It is expected that through further rounds of negotiations the schedule of concessions will be expanded and the

depth of tariff cut will be deepened further so that SAPTA could become an effective vehicle of regional economic cooperation.

So far, four rounds of trade negotiations have been concluded under SAPTA covering over 6,000 commodities. Under the first Round of Negotiations tariff concessions were offered to 226 commodities in all countries. The second Round of Negotiations resulted in exchange of tariff concessions for 1,868 products reflecting an increase by almost ten-fold over first round. The Third and Fourth Round of Trade Negotiations under SAPTA resulted in exchange of tariff concessions on 3,456 items and 1,291 items, respectively. Each Round contributed to an incremental trend in the product coverage and the deepening of tariff concessions over previous Rounds.

First Round of Negotiations

- Concluded in December 1995 following six rounds of IGG meetings
- Product by product method of negotiations
- Total of 226 items granted tariff concessions by all members
- Extended tariff cuts varied from 10-90%

Second Round of Negotiations

- Concluded in December 1996 following four IGG meetings
- Product by product method of negotiations
- Total of 1,868 items granted tariff concessions by all members
- Extended tariff cuts varied from 10-90%

Third Round of Negotiations

- Commenced in July 1997 with the 1st IGG Meeting (2nd IGG – January 1998)
- Product by product basis, sectoral basis, chapter and across the board basis
- Identification of negative/sensitive products
- Removal of structural impediments to trade
- Successfully concluded at the 3rd IGG meeting held in Kathmandu from 21st-23rd November 1998
- Altogether 3,456 items granted tariff concessions by all members
- No nontariff barriers were applicable for the products on which tariff concessions were exchanged

Fourth Round of Negotiations

- Total of 1,291 items granted tariff concessions by all members
- Bangladesh granted 92 items on November 1, 2002
- Bhutan granted 45 items on April 1, 2003
- India granted 364 items on December 20, 2004
- Maldives granted a total of 91 items on November 1, 2002, out of which 45 were granted to Bangladesh, 7 to Bhutan, 4 to India, 17 to Nepal, 6 to Pakistan and 12 to Sri Lanka
- Nepal granted 94 items on November 1, 2002
- Pakistan granted 509 items on December 22, 2003

Source: Compiled by author from <<http://www.doc.gov.lk/regionaltrade.php?mode=inop&link=sapta>> and <<http://www.saarc-sec.org/main.php?t=2.1.5>> [Accessed 5 June 2007].

Appendix 2: Status of Trade Agreements among SAARC Countries

The current status of trade agreements among SAARC countries stands (in chronological order) as follows:

- Bhutan and India signed FTA in January 1972 and has been renewing continually. The latest renewal was on July 28, 2006. The agreement on trade, commerce, and transit between Royal Government of Bhutan and Government of India is one of the most liberal trade agreements in the world, which was renewed on July 28, 2006 for another 10 years in New Delhi, India.
- Bangladesh and Nepal signed Trade and Payments and Transit Agreements in Kathmandu on April 2, 1976.
- Nepal and Sri Lanka signed Trade and Transit Agreement on April 3, 1979.
- India and Maldives signed Trade Agreement on March 31, 1981.
- Nepal and Pakistan signed Trade Agreement on July 28, 1982.
- India and Nepal signed FTA on December 6, 1991.
- South Asian Preferential Trading Arrangement (SAPTA) was signed on April 11, 1993, became operational in 1995.
- India and Sri Lanka signed FTA in December 1998.
- Bangladesh and Bhutan signed Trade Agreement in September 2000.

<http://news.bbc.co.uk/2/hi/south_asia/906691.stm>

- Pakistan and Sri Lanka's FTA became operational from June 12, 2005.
- South Asia Free Trade Area (SAFTA) was signed on January 6, 2006.
- India and Bangladesh signed the Trade Agreement on March 26, 2006.
- Bangladesh and Pakistan are in the process of discussion on pursuing a FTA between the two countries to help boost bilateral trade and investment. <http://www.bilaterals.org/article.php3?id_article=1541>
- Sri Lanka has mooted a FTA with Bangladesh citing its positive experience with the ones it has signed with India and Pakistan. <http://www.bilaterals.org/article.php3?id_article=5269>
- Pakistan has ratified the South Asia Free Trade Area (SAFTA), but the FTA between India and Pakistan was not initiated under this agreement, instead it will continue under the existing import regime. <http://www.bilaterals.org/article.php3?id_article=3908>

1972	1976	1979	1981	1982	1991	1993-95	1998	2000	2005	2006
BTN-IND	BDG-NPL	NPL-LKA	IND-MDV	NPL-PAK	IND-NPL	SAPTA	IND-LKA	BDG-BTN	PAK-LKA	IND-BDG SAFTA

Note: BDG=Bangladesh; BTN=Bhutan; IND=India; MDV=Maldives; NPL=Nepal; PAK=Pakistan; LKA=Sri Lanka; SAPTA=South Asian Preferential Trading Arrangement; and SAFTA= South Asia Free Trade Area.

Source: Compiled by author from various sources.

Appendix 3: Description of Dummy Variables

- Countries that share common Border: Bangladesh, Bhutan, India, Nepal and Pakistan.
- Countries that share common Language: Bangladesh, India, and Pakistan.
- Countries that share common Currency: Bhutan and India.
- Countries that have Trade Agreement: (1) Bangladesh with Bhutan, India, Nepal; (2) Bhutan with Bangladesh and India; (3) India with Bangladesh, Bhutan, Maldives, Nepal, Sri Lanka; (4) Maldives with India; (5) Nepal with Bangladesh, India, Pakistan, Sri Lanka; (6) Pakistan with Nepal and Sri Lanka; and (7) Sri Lanka with India, Nepal and Pakistan.
- Countries that are in conflict: Bangladesh vs. India, India vs. Pakistan, and Nepal vs. Bhutan;
- Countries that have Membership in Other Regional Trade Group(s): Bangladesh, India, and Sri Lanka
- Landlocked countries: Bhutan and Nepal.
- Island countries: Maldives and Sri Lanka.
- Countries with Seaports: Bangladesh, India, Maldives, Pakistan and Sri Lanka.

Source: Various.

Appendix 4: Conflict Intensity Index

State of Violence	Intensity Group	Level of Intensity	Name of Intensity	Definition
Non-violent	Low	1	Latent Conflict	A positional difference on definable values of national meaning is considered to be a latent conflict if respective demands are articulated by one of the parties and perceived by the other as such.
		2	Manifest Conflict	A manifest conflict indicates the use of measures that are located in the preliminary stage to violent force. This includes for example verbal pressure, threatening explicitly with violence, or the imposition of economic sanctions.
Violent	Medium	3	Crisis	A crisis is a tense situation in which at least one of the parties uses violent force in sporadic incidents.
		4	Severe Crisis	A conflict is considered to be a severe crisis if violent force is repeatedly used in an organized way.
	High	5	War	A war is a type of violent conflict in which violent force is used with a certain continuity in an organized and systemic way. The conflict parties exercise extensive measures, depending on the situation. The extent of duration is massive and of long duration.

Source: Conflictbarometer (2005), Heidelberg Institute for International Conflict Research at the Department of Political Science, University of Heidelberg. Available at

<<http://www.hiik.de/en/barometer2005/ConflictBarometer2005.pdf>>