Trade Potential in SAFTA: An Application of Augmented Gravity Model

Paper 61

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The present paper titled ***Trade Potential in SAFTA: An Application of Augmented Gravity Model*** has been prepared under the CPD programme on *Trade Related Research and Policy Development (TRRPD)*. This programme aims at strengthening institutional capacity in Bangladesh in the area of trade policy analysis, negotiations and implementation. The programme, *inter alia,* seeks to project the civil society's perspectives on the emerging issues emanating from the process of globalisation and liberalisation. The outputs of the programme have been made available to all stakeholder groups including the government and policymakers, entrepreneurs and business leaders, and trade and development partners.

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Acronyms

AFTA	ASEAN Free Trade Area
APTA	Asia-Pacific Trade Agreement
BTAs	Bilateral Trade Agreements
CGE	Computable General Equilibrium
COMESA	Common Market of Eastern and Southern Africa
CPI	Consumer Price Index
CUs	Customs Unions
EAC	East African Cooperation
ECOWAS	Economic Community of West African States
EU	European Union
FTA	Free Trade Area
GDP	Gross Domestic Product
GEP	Group of Eminent Persons
GNP	Gross National Product
IMF	International Monetary Fund
LDCs	Least Developed Countries
MFN	Most Favoured Nation
NAFTA	North American Free Trade Area
NTBs	Non-Tariff Barriers
OLS	Ordinary Least Square
PTA	Preferential Trade Agreement
RoO	Rules of Origin
RTAs	Regional Trading Agreements
SAFTA	South Asian Free Trade Area
SAPTA	SAARC Preferential Trading Arrangement
SAARC	South Asian Association for Regional Cooperation
SADC	Southern African Development Community
TLP	Trade Liberalisation Plan
WDI	World Development Indicator
WTO	World Trade Organization

Abstract

The present paper investigates the trade creation and trade diversion effects of a number of RTAs, with special focus on the SAFTA, by using a gravity model. Apart from the traditional gravity variables, the model is augmented by some other import variables (e.g. bilateral exchange rate, bilateral free trade agreement). To capture the individual country effect, along with the impact of overall RTA, a set of additional dummy variable has been introduced. The model developed in this paper is estimated by using panel data approach with country-pair specific as well as year specific fixed effects. Two stages estimation technique is deployed to arrive at the estimates. The first stage is estimated using Tobit Model, while OLS is applied in the second stage. The study finds significant intra-bloc export creation in SAPTA; however, at the same time there is evidence of net export diversion in the SAPTA. Bangladesh, India and Pakistan are expected to gain from joining the RTA, while Nepal, Maldives and Sri Lanka are likely to be negatively affected. Among the other RTAs covered under the present study, AFTA, NAFTA, SADC, MERCOSUR, CAN, EAC are associated with intra-bloc export creation and net export diversion. EU and Bangkok agreement (APTA) are found to be intra-bloc export diverting and net export diverting. BIMSTEC is found to be intra-bloc export diverting but there is no evidence of net export creation or diversion. Although none of the RTAs covered by the study was found to be net export creating, more than one third of the members of these RTAs are found to be positively affected by joining the RTAs.

TRADE POTENTIAL IN SAFTA: AN APPLICATION OF AUGMENTED GRAVITY MODEL

Mustafizur Rahman
Wasel Bin Shadat
Narayan Chandra Das

I. INTRODUCTION

In recent years growth of Regional Trading Agreements (RTAs) and Bilateral Trade Agreements (BTAs) has been quite phenomenal and unprecedented. The large majority of the WTO Members are party to one or more RTAs. As of January 2005, the WTO had been notified of 312 RTAs: of these 170 were in force. Another 65 RTAs were estimated to be operational but the WTO was yet to be notified (Crawford and Fiorentino, 2005). Thus, along with liberalisation of trade on MFN basis, countries are moving towards a faster pace of liberalisation within the regional and bilateral trading agreements. It should be mentioned here that RTAs are WTO-compatible as long as they promote deeper (compared to MFN) liberalisation. One important feature of regionalism is that developing countries are engaging themselves more and more in the RTAs.

As is known, SAARC member countries[1] (Bangladesh, Bhutan, India, Maldives, Nepal, Sri Lanka and Pakistan) approved SAARC Preferential Trading Arrangement (SAPTA) in 1993 which came into force on December 1995. In total, four rounds of trade negotiations had taken place under the aegis of the SAPTA. SAPTA graduated into South Asian Free Trade Area (SAFTA) which came into effect on 1 January 2006 with the objective of creating a FTA to include the seven South Asian countries. As per the Trade Liberalisation Plan (TLP) of SAFTA, Pakistan and India will bring down their tariff to the level of 0 – 5% by 2012 and Sri Lanka by 2013.[2] The four South Asian LDCs, Bangladesh, Bhutan, Maldives and Nepal are to reduce their tariffs to 0-5% by 2015. It is to be noted here that according to GEP Report, SAFTA is to eventually graduate into a full-fledged South Asian Economic Union.[3]

It is to be noted in view of the above that although SAARC countries have moved

[1] In 2005 Afghanistan was given membership of SAARC. For the purpose of the present study, we will not consider Afghanistan as SAARC member.
[2] The TLP relates to items which are not in the Sensitive or Negative List.
[3] The GEP Report refers to the report prepared by the Group of Eminent Persons which was set up at the 9th SAARC Summit held in Male to provide the SAARC leaders with a road map of regional cooperation.

towards a FTA, intra-regional trade flow has continued to remain very low.[4] This needs careful examination.

As the general wisdom goes, justification for any RTA should be assessed from its *trade creating* and *trade diverting* capacities. According to Viner (1950) net welfare effect attributed to FTAs and Customs Unions (CUs) could be positive or negative for the member countries and the rest of the world depending on the relative size of the trade creation and trade diversion effect. It needs to be mentioned here that trade creation occurs when, as a result of preferential tariff rate established by a RTA, domestic production of a product is displaced by the imports from a member country, where the good is produced at a lower cost. On the other hand, trade diversion takes place when, as a result of tariff preferences, imports from a low cost country outside the RTA are displaced by imports from a higher cost partner country. Although RTAs are on the ascendancy, many authors have argued against the logic of RTAs. For example, Bhagwati and Panagariya (1996) and Panagariya (1996) argue that RTAs are likely to reduce welfare in member states and impede multilateral trade liberalisation. According to them, because RTAs give preferential treatment to member states, they divert trade from non-member, least-cost suppliers. They also argue that the trade diversion is likely to dominate trade creation, leading to welfare reduction in member states of the RTA.

The debate as regards impact of RTAs has given rise to a renewed interest in estimation of their effects. Computable General Equilibrium (CGE) models and gravity models are the two major classes of quantative tools that are popularly used by trade researchers to analyse the impact of policies on economic outcomes. The focus of the present paper is to apply the gravity model to examine the effect of various RTAs, particularly the impact of SAFTA on its member countries.

The gravity model, originating from Newtonian physic notion, is an ex-post analysis approach which uses historical data to guide policy by explaining its effect where it has already been implemented. Tinbergen (1962) and Poyhonen (1963) first applied the gravity model to analyze international trade flows. Since then a large number of empirical studies applied gravity model to inspect the trade creation and trade diversion effects of the RTAs. According to this model, flows of export between two countries are explained by their economic sizes (GDP or GNP), population and direct

[4] In 2003, intra-regional export as share of global export of SAARC countries was 6.1 percent and intra-regional import as share of import of SAARC countries from the world was 4.4 percent. In contrast, the shares of intraregional trade were 44.9 percent, 60.4 percent and 22.4 percent for NAFTA, EU and AFTA respectively in 2003.

geographical distances between the countries. Most estimates of gravity model add a certain number of dummy variables to the original gravity equation that test for specific effects. This refers to membership in a RTA, sharing of a common land border and commonality of language. With inclusion of dummy variables of trade agreements, gravity model has broader implications in terms of the trade creation and trade diversion. Although empirical studies have found high explanatory value (high value of R^2) of the gravity model in explaining bilateral trade flows, as regards theoretical justification not much had been done during the early stage of its application. However, since late 1970s several developments were made as regards the theoretical underpinning of gravity model.[5]

It should be mentioned here that one needs to be cautious in drawing inferences as regards changes in welfare from the econometric results obtained from application of gravity model. According to Piermartini and Teh (2005), it is not possible to conclude that economic welfare of PTA members has increased based on the fact that estimates from the gravity model indicate that PTA has led to an increase in trade among its members. According to economic theory, overall welfare effects of a PTA depend on the balance between trade creation and trade diversion. However, empirical findings as regards trade diversion or trade creation effects in RTAs in general and SAPTA in particular are contradictory. Cernat (2001) found that AFTA, EU, SADC and COMESA were trade creating but MERCOSUR and Andean Community were trade diverting; Soloaga and Winters (2001) found that EU is trade diverting and MERCOSUR is trade creating. Dee and Gali (2003) found that AFTA, EU/EC, MERCOSUR and NAFTA are net trade diverting while Andean Community is net creating. On the other hand, Coulibaly (2004) found that SAPTA and ECOWAS are associated with net export creation while AFTA, MERCOSUR, SADC and Andean Community are associated with net export diversion.

As regards the estimated trade creation and diversion effect of SAPTA, the empirical literature could not reach any consensus. Coulibaly (2004) found net export creation and Tumbarello (2006) and Hirantha (2004) found net trade creation for SAPTA. On the other hand, Hassan (2001) found net trade diversion for SAPTA while Rahman (2003) found SAARC dummy variable to be insignificant. However, all these studies differ in methodological aspects and data coverage. Tumbarello (2006) and Hirantha (2004) applied both panel and cross-section techniques, but they did not consider the country pair specific fixed effects in estimating panel regression model. The data coverage for Tumbarello (2006) was 1984-2003 (for panel) and 1996, 1999, 2002 and

[5] See, for example, Anderson (1979), Bergstrand (1985, 1989, 1990), Deardorff (1997), Eaton and

2003 (for cross-section study of SAPTA) while Hirantha's (2004) study used data covering 1996-2002 (for panel data) and 1996, 1999 and 2002 (for cross section data). Hassan (2001) estimated gravity model using cross section data (for 1996 and 1997). Rahman (2003) estimated Bangladesh's trade potential using panel techniques with country pair specific fixed effects where data covered the period 1972-1999.

Contradictory empirical results as regards trade creation and trade diversion in SAPTA call for proper re-examination of trade creation and trade diversion effects in this RTA. The present paper investigates the trade creation and trade diversion effects of a number of RTAs, with special focus on SAFTA, by using an augmented gravity model. Matyas (1997), Matyas (1998) and Egger (2000) demonstrated that a panel data approach obtains better results compared to a cross-section approach since the former allows to capture business cycle phenomenon faced by the trading partners, and helps to disentangle time-invariant country-specific effects. Incorporation of country-pair specific fixed effect is the best way to control for heterogeneity in gravity model (Cheng and Wall, 2005). Accordingly, the gravity model developed in this paper is estimated by using panel data approach with country-pair specific as well as year specific fixed effects.

In section II, an augmented gravity model was developed for the purpose of the present study. This section also analyzes data and econometric issues. Section III discusses empirical results and finally, concluding observations are made in section IV.

II. METHODOLOGY AND DATA

II.1 Gravity Model for the Present Study

Majority of the empirical literature on gravity model use total bilateral trade flows as dependent variable. However, Cernat (2001) suggested the use of bilateral export flows arguing that for a given pair of countries, with total bilateral trade one cannot distinguish between the impact of RTA formation on exports from non-member to RTA members from that on exports from the RTA member to the non-member. For the present study, bilateral export flow was used as dependent variable.

Variables that traditionally appear in the gravity model are *GDP, Population, Distance, Common Border* and *Common Language*. The coefficients of exporter and importer *GDP* are expected to have positive signs implying that an economy with

Kortum (2002), Anderson and Wincoop (2003) and Helpman et al. (2004).

larger size trades more. According to Martinez-Zarzoso and Nowak-Lehmann (2003) the coefficient of *population* of the exporters may have negative or positive sign depending on whether the country exports less when it is big (absorption capacity) or whether a big country exports more compared to a small country (economies of scale). For similar reasons the coefficient of importer *population* may have negative or positive sign. *Distance* appears in the model as a proxy of remoteness or transportation costs implying that the coefficient of this variable is expected to have negative sign. It is also expected that coefficients of *common language* and *common border* would be positive.

To capture the impact of depreciation (or appreciation) of domestic currency, the gravity model in the study was augmented by including *real exchange rate* of dollar in terms of domestic currency, both for exporting as well as importing countries following Soloaga and Winters (2001). The coefficient of exporter exchange rate is expected to be positive while that of importer exchange rate is expected to be negative. A variable *import-GDP ratio* (as a proxy indicator of openness) was included in the model. Theoretically, this variable should have positive impact on bilateral export flows. Since, bilateral trade agreement plays important role in determining trade among partner countries, a dummy variable for bilateral agreements has been incorporated in the model. This variable takes one if two partner countries have bilateral trade agreement at time period t, and zero if they don't.

Following Coulibaly (2004), two dummy variables RTA_{1lt} and RTA_{2lt} for each RTA, where l denotes the particular RTA and t denotes the time period, are introduced to capture intra-bloc and net export effect of the RTA as a whole in the following way

$$RTA_{1lt} = \begin{cases} 1, & \textit{if both reporter (exporting) and partner (importer) countries} \\ & \textit{are the member of the RTA } l \textit{ at time } t \\ 0, & \textit{otherwise} \end{cases}$$

$$RTA_{2lt} = \begin{cases} 1, & \textit{if reporter (exporting) country is the member of the RTA } l \textit{ at time } t \\ 0, & \textit{otherwise} \end{cases}$$

A positive coefficient RTA_{1lt} measures intra-bloc export creation and negative coefficient shows intra-bloc export diversion. A positive coefficient RTA_{2lt} measures net export creation while negative coefficient measures net export diversion.

Finally, to estimate the impact on the individual member country of a particular RTA, a set of dummy variables $RTAC_{lmt}$ (one for each country) are introduced:

$$RTA_{lmt} = \begin{cases} 1, & if\ reporter\ (\text{exp}orting)\ country\ m\ is\ the\ member\ of\ the\ RTA\ l\ at\ time\ t \\ 0, & otherwise \end{cases}$$

where l is the RTA, m is the member of respective RTA and t denotes the time period. These variables will give insights on the impact of RTA on individual member countries since the date of entry into force of the RTA. For example, a dummy variable for Bangladesh under SAPTA is included in the model which takes the value of one if exporting country is Bangladesh and when it is the member of SAPTA. However, net effect on member *m* of the *RTA l* will be found by adding the coefficient of RTA_{2lt} and coefficient of $RTAC_{lmt}$.

II.2 Estimation Technique and Econometric Issues

In this study, panel data approach with country-pair specific fixed effect will be used to estimate the augmented gravity model outlined in the previous section.[6] In addition, the regression model has incorporated year specific fixed effects.

The regression model has been estimated in two stages following Coulibaly (2004). The first stage regression includes only all time varying variables which would mean that variables distance, common language and common border which do not vary over time are excluded from the first stage regression. Country-pair specific and year-specific fixed effects are introduced at this stage. The second stage regression on pooled data uses the estimated country-pair specific effects as dependent variable and includes both time varying and time constant variables. Regression coefficients at the first stage measure the time dimension effect of the variables and those of the second stage measure cross section specification effects.[7] Time dimension effect is due to the historical causes and cross section specification effect is due to the structural causes. According to Anson *et.al* (2005) historical causes may be war periods, economic and financial crisis or even disadvantageous Rules of Origin (RoO) adopted by the RTAs. On the other hand, according to Coulibaly and Fontagné (2004) structural causes can be economic structural distortions (persistently high debt burden or high unemployment level) or geography (land-lockness or low-quality infrastructures, for instance) of the trading partners. The two stage regression is as follows[8]:

[6] Another way is to use random effect model. But county specific effects should be assumed random if we use a larger sample including any country at random (Matyas (1997) and Matyas (1998)).
[7] However, Coulibaly (2004) incorporated bilateral real exchange rate at the second stage only treating it as a bilateral variable. But bilateral real exchange rate may have a time dimension effect. So, real exchange rates of both exporter and importer were taken in both stages.

First Stage

$$\ln EX_{ijt} = a + a_{ij} + a_t + b_1 \ln GDP_{it} + b_2 \ln GDP_{jt} + b_3 \ln POP_{it} + b_4 \ln POP_{jt} + b_5 \ln EXCH_{it} + b_6 \ln EXCH_{jt} + b_7 (IM/GDP)_{jt} + b_8 BILATERAL_t + \sum_l b_{9l} RTA_{1lt} + \sum_l b_{10l} RTA_{2lt} + \sum_l \sum_m \beta_{l,m} RTAC_{lmt} + \varepsilon_{ijt} \quad (1)$$

Second Stage

$$a_{ij} = c + c_1 \ln GDP_{it} + c_2 \ln GDP_{jt} + c_3 \ln POP_{it} + C_4 \ln POP_{jt} + c_5 \ln EXCH_{it} + c_6 \ln EXCH_{jt} + c_7 (IM/GDP)_{jt} + c_8 BILATERAL_t + c_9 \ln DIS_{ij} + c_{10} LAN + c_{11} BOR + \sum_l c_{12l} RTA_{1lt} + \sum_l c_{13l} RTA_{2lt} + \sum_l \sum_m \theta_{l,m} RTAC_{lmt} + \omega_{ijt} \quad (2)$$

where, EX_{ijt} is the export flow from country i to country j at time period t, a_{ij} is the country pair fixed effects ($a_{ij} \neq a_{ji}$), a_t is the year specific fixed effect, GDP_{it} (GDP_{jt}) is Gross Domestic Product of country i (j) at time period t, POP_{it} (POP_{jt}) is the population of country i (j) at time period t, $EXCH_{it}$ ($EXCH_{jt}$) is the real exchange rate of country i (j) at time period t, $BILATERAL_t$ is a dummy variable taking the value of one if two partner countries have bilateral agreement at time period t, DIS_{ij} is the distance between country i and j, LAN is a dummy variable taking value of one if two countries have common language, BOR is a dummy variable taking value of one if two countries share common border, $(IM/GDP)_{jt}$ is the import-GDP ratio of importing county indicating openness of the economy, *ln* is the natural logarithm operator, and ε_{ijt} and ω_{ijt} are the error terms.

It is to be expected that for such a big sample bilateral exports between some country pairs might be zero. These pairs with zero export flows create a problem for estimation of the gravity model in log linear form. To counter this problem the variable export flows X_{ij} are replaced by $(X_{ij}+1)$ so that logarithm can be taken even for zero export flows and in this case $\ln (X_{ij}+1)=0$. Considering this incidence of zeros in the dependent variable in the first stage regression, Tobit Model (proposed by James Tobin, 1958) was used to estimate the coefficients and marginal (impact)

[8] For second stage regression country pair-specific fixed effects (dependent variable), distance,

effects were calculated for continuous (dummy) variables in the usual way. On the other hand, second stage regression was estimated by using OLS. To arrive at the total effect for a time varying variable, the two estimated coefficients which are statistically significant, obtained from the above mentioned two stage regressions, are added. While the estimates of the time constant variables are obtained solely from second stage regression.

Klien's rule of thumb (Klien, 1962) was used to test for multicollinearity. In this method, one needs to regress j-th independent variable, $j = 1,2,\cdots,k$ on the remaining $k-1$ independent variables and computed R_j^2 from each regression. If any of R_j^2 is significantly higher than R^2 obtained from full model, one can conclude that there is multicollinearity problem in the model.

II.3 Data

The sample consists of ten RTAs (Appendix Table A1). However, Botswana, Lesotho, Mozambique, Namibia and Swaziland of SADC and Bhutan belonging to the SAPTA are excluded from the study due to data constraint. However, Japan, Australia, Hong Kong and Taiwan are taken in the analysis considering their significant trade share with the SAPTA member countries. Thus the sample consists of 61 countries. The time period under study is 1991-2003. Therefore, our data consists of 3660 country pairs with 47580 observations. Bilateral export flows measured at current million US$ are taken from IMF DOTS database. Data on GDP (at current US$) and Population (in million) has been taken from World Development Indicator (WDI). Data on Exchange rate and Consumer Price Index (CPI) has been taken from IFS CD-ROM. Distance is measured as kilometer and compiled from John Haveman's International Trade data website.[9]

common language and common border, which do not vary over time, are repeated for each year.

[9] (http://www.macalester.edu/research/economics/PAGE/HAVEMAN/Trade.Resources/TradeData.html)

III. RESULTS AND DISCUSSION

In this section the results of the augmented gravity model are discussed. The econometric analysis begins with the test for multicollinearity among the variables. Table1 reports R^2 obtained from full model and R_j^2 obtained from individual regression. As is revealed from the Table 1, R^2 obtained from OLS estimation of the full model is greater than each individual R_j^2 indicating there is no multicollinearity problem in the model.

TABLE 1: MULTICOLLINEARITY TEST

R-squared from Overall Model (OLS)=0.64

Regression	R-squared
When IM-GDPR is the dependent variable	0.033
When ln (GDPEX) is the dependent variable	0.505
When ln (POPEX) is the dependent variable	0.475
When ln (GDPIMP) is the dependent variable	0.502
When ln (POPIMP) is the dependent variable	0.480
When ln (EXCHEX) is the dependent variable	0.176
When ln (EXCHIMP) is the dependent variable	0.175

Note: IM-GDPR is the Import-GDP ratio of importing country, GDPEX is the GDP of exporting country, POPEX is the population of exporting country, GDPIMP is the GDP of importing country, POPIMP is the population of importing country, EXCHEX is the real exchange rate of exporting country and EXCHIMP is the real exchange rate of importing country.

The discussion on the model estimates are presented in the next two subsections: the variables which do not vary for different RTAs (i.e. GDP, Population, Distance, Common Border, Common Language, Real Exchange Rate and Import-GDP ratio and bilateral dummy variable) are discussed first. Hereafter, these variables will be termed as common gravity variables. Finally, the estimates of RTA- and their member country- specific dummy variables are examined, with particular focus on SAPTA, to investigate the gains (losses) arising from formation of the RTA in terms of trade creating (diverting) effects.

III.1 Impact of Common Gravity Variables

Table 2 displays the results of the tobit estimates (marginal/impact effect) for first stage regression and OLS estimates for second stage regression along with the estimated total effects for the common gravity variables. Test statistics for overall significance of the model follow F-distribution for the second stage and Chi-square distribution for the first stage. It appears that both tests are highly significant implying that the null hypotheses of all coefficients simultaneously equal to zero are rejected in

both cases (Table 2). The sign of all the estimates of common gravity variables are in right direction and are in line with the theoretical justification.

For example, the coefficients of GDP of both exporters and importers are positive and significant at 5% level of significance. For one percent increase in GDP of exporting (importing) country, bilateral export flow would increase by 0.97 (0.90%) percent. This approximate proportional relationship between bilateral export flows and size of the economy (either exporter or importer) indicates that intra-SAARC trade could rise significantly if the SAARC counties could maintain strong economic growth. Both common border and common language demonstrate positive and statistically significant effects. If two countries share a common border (language), export flow between them could be 171% (51%) percent more than two otherwise similar countries. The coefficient of Import-GDP ratio of importing country is positive and statistically significant. For one percent increase in openness, bilateral export flow increases by 1.06 percent. This indicates that it is possible that increased openness of the SAARC member countries could boost intra-regional trade in the region. It is interesting to observe that export between two countries would increase 222 percent if there exits a bilateral trade agreement between the countries compared to the country-pairs without having bilateral trade tie.

On the other hand, distance, which is a proxy of transportation cost, shows negative sign and is statistically significant. The estimation results also show that population of both exporting and importing countries have negative impact on bilateral export flows. In other words, increasing population in the exporting country results in the rise of the absorption capacity of the domestic market while increasing population in importing country contribute to the economies of scale of the domestic industry. However, the impact of population is found very low indicating that population growth in SAARC countries would have a little effect on their bilateral trade flows.

Finally, the coefficients of exporter's exchange rate and importer's exchange rate are what is to be expected, and are statistically significant, the effect of both exporter and real exchange rates is very low. Thus, it appears that devaluation of domestic currency may not be an effective tool to increase exports of a country.

TABLE 2: TWO WAY FIXED EFFECT MODEL ESTIMATION RESULTS

Variable	Marginal Effect from First Stage (Tobit)	Coefficient from Second Stage (OLS)	Total Effect
IM-GDPR	1.043*	-0.981*	1.064
lnGDPEX	0.175*	0.797*	0.972
lnGDPIMP	0.410*	0.485*	0.895
lnPOPEX	0.032	-0.113*	-0.113
lnPOPIMP	-0.068*	-0.020*	-0.088
lnEXCHEX	0.093*	-0.015*	0.077
lnEXCHIMP	0.033*	-0.038*	-0.005
lnDISTANCE		-0.868*	-0.868
Dummy Variables	*Impact effect*	*Coefficient*	*% equivalent*
LANGUAGE		0.997*	171.0
BORDER		0.415*	51.4
BILATERAL	-0.322*	1.492*	222.1
No. of observations	47580	47580	
R-squared or Pseudu R^2	0.59	0.75	
Pro>F or Pro>Chi-square	0.000	0.000	

Notes:
1. * denotes significant at 5% level of significance.
2. Total effect is found by adding Marginal/Impact effect in the first stage and coefficients in the second stage 5 percent level of significance.
3. Results are corrected for heteroscedasticity.
4. Dummy coefficients are reported in last column by taking [{exp(coefficient)}-1]*100 after summing two stage results.
5. IMP-GDPR coefficient is reported as exp(coefficient) in the last column after summing the two stage results.
6. ln is the natural logarithm operator.
7. First stage is estimated using Tobit model while second stage is estimated using OLS. Coefficients of first stage results are not reported.

III.2 Impacts on RTAs and Their Member Countries

Impact on SAPTA and Its Member Countries

The results suggest that SAPTA is associated with intra-bloc export creation (table 3). If two countries are the members of SAPTA, export flow between them is 135.4 percent more than two otherwise similar countries. However, SAPTA is associated with net export diversion. In other words, intra-bloc export increases at the costs of reduction in extra-regional export. Both intra-bloc export creation and net export diversion are reported by cross section specification of the data (i.e. the result of second stage regression).

TABLE 3: IMPACT OF SAPTA ON ITS MEMBERS

Variable	First Stage (Tobit)	Second Stage (OLS)	Summary		
	Impact effect	Coefficient	Total effect	Net effect	[{exp(net effect)}-1]*100
SAPTA1	-0.111*	0.967*	0.856	0.856	135.4
SAPTA2	-0.037	-0.327*	-0.327	-0.327	-27.9
Bangladesh	0.246**	0.600*	0.600	0.273	31.4
India	0.341*	-0.079	0.341	0.014	1.4
Maldives				-0.327	-27.9
Nepal	-0.130	-0.621*	-0.621	-0.948	-61.3
Pakistan	-0.057	0.711*	0.711	0.384	46.8
Sri Lanka	0.085	-0.072		-0.327	-27.9

Notes:
1.* and ** denote significant at 5% and 10% level of significance respectively.
2. Total effect is found by summing impact effects in the first stage and coefficient in the second stage at 5% level of significance.
3. Net effect for each country is found by adding SAPTA2 coefficient and each country coefficient.
4. Results are corrected for heteroscedasticity.
5. As the dependent variable appears as natural logarithm, net effect is also reported as [{Exp(net effect)}-1]*100 for interpretational convenience.
6. First stage is estimated using Tobit model while second stage is estimated using OLS. Coefficients of first stage results are not reported.

However, all members of the SAPTA are not equally affected by the creation of SAPTA. A close inspection of table 3 reveals that Bangladesh, India and Pakistan are positively affected due to the creation of SAPTA. For Bangladesh and Pakistan, positive impacts are reported by cross-section specification rather than time dimension (first stage regression). For Bangladesh time dimension effect is found to be positive at 10 percent level of significance. On the other hand, positive impact on India follows from time dimension specification indicating a robust economic performance encountered by India during the period 1995-2003. Other countries are affected negatively due to the creation of SAPTA which is mainly the direct consequences of net export diversion and captured mainly in cross-section specification implying that negative export performance of these countries are due to the structural limitation (such as landlockness of Nepal).

As was mentioned earlier, Coulibaly (2004) found that SAPTA appeared to be intra-bloc export creating and net export diverting. The study found that among the member countries, India and Maldives were positively affected, but not to any large extent. It should be noted here that in Coulibaly (2004) the study period was up to 2000 while the current study covers the period up to 2003. It is to be mentioned here that our study has captured the effect of BTAs and as revealed in the literature the FTA between India and Sri Lanka has boosted their bilateral trade.

It is worthwhile to mention here that substantial size of informal intra-regional trade

in SAARC countries, particularly between India and Bangladesh (estimates varies between US$2.0 billion to US$3.0 billion), is not captured in the official statistics that has been used in this study and thus underestimates the actual bilateral export flows between them. Trade potential in the SAPTA countries is also hampered by the political conflicts which should be taken into cognisance to promote intraregional trade in SAARC countries.

Impact on Other RTAs and their Member Countries

Results of the other RTA specific analysis are presented in Appendix Table A2. It appears from Table A2 that BIMSTEC had been intra-bloc export diverting but there is no evidence of net export diversion or creation. Export flow between two BIMSTEC member countries is 58 percent lower than two otherwise similar countries. Intra-bloc export diversion is reported from cross-section specification. At country level, significant impact from this agreement is observed only for Myanmar for which the impact is negative which is reported from cross section specification. However, at 10% level of significance India is found to be negatively impacted which is reported from cross-section specification. For no other country significant adverse or positive impact is seen due to creation of the BIMSTEC. It appears that in order to reap benefits from BIMSTEC, member countries need to enhance their areas of cooperation.

Bangkok agreement[10] is associated with intra-bloc export diversion and net export diversion (Table A2). Intra-bloc export diversion is the effect of cross-section specification. On the other hand, stronger negative time dimension effect offsets the positive cross-section effect resulting in an overall net export diversion. As regards the country specific effects, only China and Korea are positively affected. Other countries are negatively affected due to the Bangkok Agreement.

As is revealed from Table A2, AFTA has been intra-bloc export creating. If two countries are members of AFTA, export flow between them is 55.5 percent more than two otherwise similar countries. However, AFTA has been net export diverting. Both intra-bloc export creation and net export diversion are reported from cross section specification of the data. Indonesia, Lao PDR, Malaysia, Singapore, Thailand and Vietnam are positively affected by the creation of AFTA. In other words, these countries appeared to have experienced an increase in their extra-regional exports after joining the RTA. Positive impact on Indonesia is reported from both cross

[10] As of 2005, the Bangkok Agreement was named Asia-Pacific Trade Agreement (APTA).

section specification and time dimension specification while that on Vietnam is reported from time dimension specification indicating that these two countries performed well during periods of their joining the AFTA. Positive impacts on other countries (Lao PDR, Malaysia, Singapore and Thailand) are reported from cross section specification.

EU appears to have been intra-bloc export diverting and net export diverting (Table A2). Intra-bloc export diversion is reported from both cross section specification and time dimension specification while net export diversion is reported from cross section specification. Belgium, Denmark, Finland, France, Germany, Ireland, Luxembourg, Netherlands, Sweden and UK are found to be positively affected due to the creation of the EU. Positive impacts on Finland and Sweden are reported from both time dimension and cross section specification. On the other hand positive impacts on Denmark, Ireland and Luxemburg come from time dimension specification.

Estimation result suggests that there is robust intra-bloc export creation in NAFTA (Table A2). If two countries are the members of NAFTA, export flow between them is 361 percent more than two otherwise similar counties. However, NAFTA is associated with net export diversion which is found from cross section specification of the data. None of the countries is found to be affected positively by the creation of NAFTA. Thus all the NAFTA countries experienced decrease in their extra regional export due to creation of this RTA. Negative impact is mainly the direct consequence of net export diversion.

SADC appears to have been intra-bloc export creating and net export diverting (Table A2). These are attributed to cross section specification. All countries, except South Africa and Malawi, are adversely affected by the creation of SADC. These two countries appear to have experienced an increase in their extra regional export being members of this RTA. Positive impact on South Africa and Malawi is identified from time dimension and cross section specification respectively.

MERCOSUR also appears to have led to intra-bloc export creation (Table A2). If two countries are members of MERCOSUR, then export flow between them is 215 percent more than otherwise two similar countries. But there is evidence of net export diversion in MERCOSUR. Among the four member countries, only Argentina is found to be positively affected due to creation of this RTA. However, Brazil is found to be positively affected at 10 percent level of significance.

In case of EAC, the results testify to intra-bloc export creation and net export diversion (Table A2). Intra-bloc export creation is reported from cross section specification while net export diversion is reported from both time dimension and cross section specification. All the countries under EAC are affected negatively indicating that these countries have experienced decrease in their extra-regional export flows after joining the EAC. Negative impact on Kenya and Tanzania is the direct consequence of net export diversion.

CAN experienced intra-bloc export creation but with net export diversion (Table A2). If two countries are members of CAN, export flow between them is 293 percent more than two otherwise similar countries. Note that only Peru and Bolivia are affected positively due to creation of CAN. Positive effect on Peru and Bolivia arises both from time dimension and cross-section specification.

In summary, it is observed that all RTAs, except BIMSTEC, Bangkok Agreement and EU, are associated with intra-bloc export creation; however, none of the RTAs, was found to be associated with net export creation. Surprisingly, two notable RTAs EU and NAFTA, are found to be net export diverting. However, there is evidence of trade diversion in EU and NAFTA in a number of earlier studies. Soloaga and Winters (2001) found that EU is trade diverting. Dee and Gali (2003) found that EU/EC and NAFTA are net trade diverting. Based on trade and tariff information at 2-digit levels of the Harmonized System, Fukao et al (2002) showed that NAFTA has resulted in trade diversion especially in respect to U.S. imports of textiles and apparel products from Mexico.

IV. CONCLUDING OBSERVATIONS

The augmented gravity model was developed in this study to identify trade creation and trade diversion effects originating from SAPTA and other nine RTAs. Panel data approach with country pair specific fixed effects and year specific fixed effects was followed. Two-stage estimation method was pursued to capture the time dimension and cross section specification of the data.

Coefficients of all the common gravity variables (i.e. GDP, Population, Distance, Common Border, Common Language, Real Exchange Rate and Import-GDP ratio and bilateral dummy variable) bear expected sign, and are statistically significant. Export flows between trading partners are significantly explained by the size of the economy (both exporter and importer), distance between countries, commonality of language and common border. There is approximately proportional relationship between

bilateral export flows and size of the economy (either exporter or importer) indicting that potential high economic growth of south Asian counties (particularly for India, Bangladesh and Sri Lanka) may boost their trade flows. Interestingly, openness of importing country is associated with a significant surge in bilateral exports. This indicates that it is highly possible that reduction in tariff barriers within the SAFTA region may raise intra-regional trade in the region. However, impact of devaluation of domestic currency on bilateral export flows was found to be low. This indicates that a devaluation of domestic currency may not be an effective tool to increase exports of a country.

It was found that there is significant intra-bloc export creation in SAPTA; however, at the same time there is evidence of net export diversion in the SAPTA. It has also been found that Bangladesh, India and Pakistan are expected to gain from joining the RTA, while Nepal, Maldives and Sri Lanka are negatively affected. Among these three countries Nepal and Maldives are enjoying LDCs status and by utilizing the S&D treatment accorded under the SAFTA these two countries can reap benefits from the SAFTA. Among the other RTAs, AFTA, NAFTA, SADC, MERCOSUR, CAN, EAC are associated with intra-bloc export creation and net export diversion. EU and Bangkok agreements were found to be intra-bloc export diverting and net export diverting. BIMSTEC was found to be intra-bloc export diversion but there is no evidence of net export creation or diversion. Although none of the RTAs covered the study was found to be net export creating, more than one third of the members of these RTA were found to be positively affected by joining the RTAs.

Not surprisingly, extent of intra-bloc export creation in SAPTA member countries is much lower than that of several other notable RTAs: NAFTA, SADC, CAN, EAC and MERCOSUR. It is, however, to be expected that with dismantling of tariff barriers under the SAFTA a large part of the informal trade will come under purview of formal trade. Reduction in tariff barriers and non-tariff barriers within the region as well as introduction of favorable RoO could raise intra-regional trade in the SARRC region. SAARC countries will need to take concrete steps for harmonization of customs and other procedures, mutual recognition of certificates and standards and trade facilitation measures. Elimination of trade barriers and structural rigidities originating from adverse political relationship could lead to substantial increase in intra-SAARC trade. Measures to stimulate investment flows from intra-regional and extra-regional sources could also boost intra-SAARC trade by providing preferential access to the produced goods.

V. REFERENCES

1. Anderson, J.E. (1979), "A Theoretical Foundation for the Gravity Equation", *The American Economic Review*, Vol. 69, No.1, pp. 106-16.
2. Anderson, J.E. and Wincoop, E. V. (2003), "Gravity with Gravitas: A Solution to the Border Puzzle", *The American Economic Review*, Vol. 93, No. 1, pp. 170-192.
3. Anson, J., Cadot, O., Estevadeordal, A., de Melo, J., Suwa-Eisenmann, A. and Tumurchudur, B. (2005), "Rules of Origin in north-South Preferential Trading Arrangements", *Review of International Economics*, Volume 13, No. 3, pp. 501-517.
4. Bergstrand, J.H. (1985). "The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence", *The Review of Economics and Statistics*, Vol. 67, No. 3, pp. 474-481.
5. Bergstrand, J.H. (1989), "The Generalized Gravity Equation, Monopolistic Competition, and the Factor Proportion Theory in International Trade", *The Review of Economics and Statistics*, Vol. 71, No. 1, pp.143-153.
6. Bergstrand, J.H. (1990), "The Heckscher-Ohlin-Samuelson Model, the Linder Hypothesis, and the Determinants of Bilateral Intra-Industry Trade", *Economic Journal*, Volume 100, No. 403, pp. 1216-1229.
7. Bhagwati J. and Panagariya, A. (1996). *The Economics of Preferential Trade Agreements,* Washington: AEI Press.
8. Cernat, L. (2001), "Assessing Regional Trade Arrangments: Are South-South RTAs More Trade Diverting?", *Global Economy Quarterly*, Vol. 2, No. 3, pp. 235-59.
9. Cheng, I-Hui, and Wall, H. J. (2005): "Controlling for Heterogeneity in Gravity Models of Trade and Integration", *Federal Reserve Bank of St. Louis Review,* Volume 87, No. 1, pp. 49–64.
10. Coulibaly, S. (2004), "On the Assessment of Trade Creation and Trade Diversion Effects of Developing RTAs," Paper Presented at the Annual Meeting 2005 of the Swiss Society of Economics and Statistics on Resource Economics, Technology, and Sustainable Development. (available at http://www.wif.ethz.ch/resec/sgvs/078.pdf)
11. Coulibaly, S. and Fontagné, L. (2006), "South-South Trade: Geography Matters", *Journal of African Economies*, Vol. 15, No. 2, pp. 313-341.
12. Crawford, J. and Fiorentino, R. (2005). "The Changing Landscape of Regional Trade Agreements", Discussion Paper No. 8, The World Trade Organization, Geneva.
13. Deardorff, A. V. (1997), "Determinants of Bilateral Trade: Does Gravity Work in a Neo-classical World?" in J. Frankel (ed.), *Regionalization of the World Economy*, Chicago: University of Chicago Press, 7-31.

14. Dee, P. and Gali, J. (2003). "The Trade and Investment Effects of Preferential Trading Arrangements", NBER working paper No. 10160.
15. Eaton, J. and Kortum, S. (2002) "Technology, Geography, and Trade", *Econometrica*, Vol. 70, No. 5, pp. 1741-1779.
16. Egger, P. (2000), "A Note on the Proper Econometric Specification of the Gravity Equation", *Economics Letters*, Vol. 66, pp. 25-31.
17. Fukao, K., Okubo, T. and Stern, R. M. (2002), "An Econometric Analysis of Trade Diversion under NAFTA", *The North American Journal of Economics and Finance*, Vol. 14, pp. 3-24.
18. Hassan, M.K. (2001), "Is SAARC a Viable Economic Block? Evidence from gravity model", *Journal of Asian Economics,* Volume 12, No. 2, pp. 263-290.
19. Helpman, E., Melitz, M. and Rubinstein, Y. (2004), "Trading Partners and Trading Volumes", Working Paper (preliminary version), Harvard University.
20. Hirantha, S.W. (2004), "From SAPTA to SAFTA: Gravity Analysis of South Asian Free Trade" Paper presented at the European Trade Study Group (ETSG) 2004 Programme, September, Nottingham.
21. Klien, L.R. (1962), *An Introduction to Econometrics*, Prentice-Hall, Englewood Cliffs.
22. Martinez-Zarzoso, I. and Nowak-Lehmann, F. (2003) "Augmented Gravity Model: An Empirical Application to Mercosur-European Union Trade Flows", *Journal of Applied Economics*, Vol. 6, No. 2, pp. 291-316.
23. Matyas, L. (1997), "Proper Econometric Specification of the Gravity Model", *The World Economy*, Vol. 20, No. 3, pp. 363-368.
24. Matyas, L (1998), "The Gravity Model: Some Econometric Considerations", *The World Economy*, Vol. 21, No. 3, pp. 397-401.
25. Panagariya, A. (1996). "The Free Trade Area of the Americas: Good for Latin America?", *The World Economy*, Vol. 19, No. 5, pp. 485 – 516.
26. Piermartini, R. and Teh, R. (2005), "Demystifying Modelling Methods for Trade Policy", Discussion Paper No. 10, The World Trade Organization, Geneva.
27. Poyhonen, P. (1963) "Toward a General Theory of International Trade", *Ekonomiska Samfundets Tidskrift*, Vol. 16, No. 2, 69-78.
28. Rahman, M. M. (2003), "A Panel Data of Bangladesh's Trade: The Gravity Model Approach", Paper presented at the European Trade Study Group (ETSG) 2003 Programme. September. Madrid.
29. Soloaga, I and Winters, L.A. (2001), "Regionalism in the Nineties: What Effect on Trade?" *The North American Journal of Economics and Finance*, Vol. 12, pp.1-29.

30. Tinbergen, J. (1962), *Shaping the World Economy: Suggestions for an International Economic Policy*. New York: Twentieth Century Fund.
31. Tobin, J. (1958), "Estimation of Relationships for Limited Dependent Variables", *Econometrica*, Vol. 26, No. 1, pp. 24-36.
32. Tumbarello, P. (2006), "Are Regional Trade Agreements in Asia Stumbling or Building Blocks? Some Implications for the Mekong Countries", Paper prepared for the seminar on *Accelerating Development in the Mekong Region—the Role of Economic Integration*, Siem Reap, Cambodia, June 26–27, 2006. (available at http://www.imf.org/external/np/seminars/eng/2006/mekong/pt.pdf)
33. Viner, J. (1950), *The Customs Union Issue.* New York: Carnegie Endowment for International Peace.

APPENDIX

TABLE A1: AN OVERVIEW OF THE RTAs COVERED IN THE PRESENT STUDY

RTA	Definition	Member Countries	Share (%) of Intra-regional Trade in 2003 (billion US$)
AFTA	ASEAN Free Trade Area	Brunei, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam	Export: 22.05% (100.72) Import: 22.80% (88.12) Trade: 22.39% (188.84)
EU (15)	European Union	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden and UK	Export: 61.55% (1782.68) Import: 59.15% (1656.53) Trade: 60.37% (3439.21)
MERCOSUR	Southern Common Market	Argentina, Brazil, Paraguay and Uruguay	Export: 11.65% (12.42) Import: 18.74% (13.38) Trade: 14.49% (25.80)
SADC	Southern African Development Community	Angola, Congo, Malawi, Mauritius, Seychelles, South Africa, Tanzania, Zambia, Zimbabwe, Botswana, Lesotho, Mozambique, Namibia and Swaziland	n.a.
CAN	Andean Community	Bolivia, Columbia, Ecuador, Peru and Venezuela	Export: 7.83 % (4.78) Import:12.33% (5.15) Trade: 9.65% (9.93)
SAPTA	SAARC Preferential Trading Arrangement	Bangladesh, India, Maldives, Nepal, Pakistan, Bhutan and Sri Lanka	Export: 6.10% (5.29) Import: 4.10% (4.83) Trade: 5.20% (10.12)
Bangkok Agreement (APTA)	Asia-Pacific Trade Agreement	Bangladesh, China, India, Korea, Lao and Sri Lanka	Export: 10.06% (70.78) Import: 11.78% (79.92) Trade: 10.90% (150.70)
BIMSTEC	Bangladesh, India, Myanmar, Sri Lanka and Thailand Economic Cooperation	Bangladesh, India, Myanmar, Sri Lanka and Thailand	Export: 4.32% (6.70) Import: 3.21% (5.30) Trade: 3.75% (12.00)
EAC	East African Cooperation	Kenya, Tanzania and Uganda	Export: 14.06% (0.57) Import: 7.95% (0.62) Trade: 10.04% (1.20)
NAFTA	North American Free Trade Area	Canada, Mexico and USA	Export: 56.13% (651.21) Import: 37.41% (656.98) Trade: 44.86% (1308.19)

Source: UN COMTRADE.

Notes:

1. n.a. indicates not available.
2. The data for Bhutan is excluded for SAPTA export, import and trade figures.
3. Botswana, Lesotho, Mozambique, Namibia and Swaziland of SADC and Bhutan belonging to the SAPTA are not included in the study.

TABLE A2: IMPACT OF OTHER RTAs ON THEIR MEMBERS

Variable	First stage (Tobit)	Second stage (OLS)	Summary		
	Impact effect	Coefficient	Total effect	Net effect	[{exp(net effect)}-1]*100
BIMSTEC					
BIMSTEC1	0.042	-0.865*	-0.865	-0.865	-57.9
BIMSTEC2	-0.052	0.094			
Bangladesh	0.281	-0.153			
India	0.128	-0.228**			
Myanmar	0.064	-3.188*	-3.188	-3.188	-95.9
Sri Lanka	0.067	-0.171			
Thailand					
Bangkok Agreement (APTA)					
BANGKOK1	0.000	-0.404*	-0.404	-0.404	-33.2
BANGKOK2	-1.867*	1.100*	-.0.767	-0.767	-53.6
Bangladesh	1.198	-0.308*	-0.308	-1.135	-67.8
China	2.758*	-0.706*	2.051	1.224	240.1
India	1.491**	-0.500*	-0.500	-1.327	-73.5
Korea	4.437*	-2.770*	1.667	0.840	131.6
Lao				-0.827	-56.3
Sri Lanka	1.524**	-0.192		-0.827	-56.3
AFTA					
AFTA1	0.014	0.442*	0.442	0.442	55.51
AFTA2	0.310*	-0.846*	-0.536	-0.536	-41.50
Brunei	-0.306**	0.250		-0.536	-41.50
Cambodia	0.038	0.352		-0.536	-41.50
Indonesia	0.240*	0.616*	0.856	0.320	37.72
Lao PDR		0.607*	0.607	0.071	7.32
Malaysia	0.070	2.149*	2.149	1.613	401.60
Myanmar	-0.348*		-0.348	-0.884	-58.69
Philippines	-0.102	0.434**		-0.536	-41.50
Singapore	0.169	2.207*	2.207	1.671	431.84
Thailand	-0.166	1.617*	1.617	1.081	194.72
Vietnam	1.142*	-0.441**	1.142	0.606	83.29
EU (15)					
EU1	-0.115*	-0.334*	-0.449	-0.449	-36.15
EU2	-0.080**	-0.127*	-0.127	-0.127	-11.90
Austria				-0.127	-11.90
Belgium	-1.703*	2.938*	1.235	1.109	202.99
Denmark	2.291*	-1.747*	0.544	0.417	51.73
Finland	0.153*	0.535*	0.688	0.562	75.35
France	0.190	0.235*	0.235	0.108	11.39
Germany	0.177	0.480*	0.480	0.354	42.43
Greece	0.127	-1.064*	-1.064	-1.191	-69.61
Ireland	1.347*	-0.418*	0.929	0.803	123.18
Italy	0.929*	-0.854*	0.075	-0.052	-5.08
Luxembourg	5.733*	-5.361*	0.372	0.245	27.82
Netherlands	0.351	0.658*	0.658	0.531	70.08
Portugal	0.528*	-0.715*	-0.187	-0.314	-26.94
Spain	2.700*	-2.935*	-0.235	-0.361	-30.32
Sweden	0.157*	0.574*	0.731	0.604	82.96
UK	0.611**	0.127*	0.127	0.000	0.03

TABLE A2: IMPACT OF OTHER RTAs ON THEIR MEMBERS (CONTINUED)

Variable	First stage (Tobit)	Second stage (OLS)	Summary		
	Impact effect	Coefficient	Total effect	Net effect	[{exp(net effect)}-1]*100
NAFTA					
NAFTA1	0.122*	1.407*	1.529	1.529	361.15
NAFTA2	0.077	-2.509*	-2.509	-2.509	-91.87
Canada	-0.349*	2.361*	2.012	-0.497	-39.17
Mexico				-2.509	-91.87
USA	0.006	2.188*	2.188	-0.322	-27.49
SADC					
SADC1	0.017	1.230*	1.230	1.230	242.13
SADC2	-0.050	-0.478*	-0.478	-0.478	-38.03
Angola				-0.478	-38.03
Congo	-0.605*	0.332**	-0.605	-1.083	-66.16
Malawi	-0.243**	0.716*	0.716	0.238	26.83
Mauritius	0.100	0.409*	0.409	-0.070	-6.75
Seychelles	0.247**	-0.403**		-0.478	-38.03
South Africa	3.606*	-2.602*	1.004	0.525	69.09
Tanzania	0.060	0.225		-0.478	-38.03
Zambia	-0.605*	0.423*	-0.182	-0.660	-48.32
Zimbabwe	-0.594*	1.041*	0.447	-0.031	-3.09
MERCOSUR					
MERCOSUR1	0.120	1.147*	1.147	1.147	214.77
MERCOSUR2	-0.138	-0.533*	-0.533	-0.533	-41.33
Argentina	-0.013	0.597*	0.597	0.063	6.55
Brazil	0.709**			-0.533	-41.33
Paraguay		-0.360*	-0.360	-0.894	-59.09
Uruguay	0.359	0.152**		-0.533	-41.33
EAC					
EAC1	0.163	2.380*	2.380	2.380	980.12
EAC2	-0.243*	-0.186*	-0.429	-0.429	-34.90
Kenya	0.120			-0.429	-34.90
Tanzania		0.080		-0.429	-34.90
Uganda	0.123	-0.975*	-0.975	-1.404	-75.43
CAN					
CAN1	-0.172	1.369*	1.369	1.369	293.14
CAN2	-2.413*	-1.611*	-4.024	-4.024	-98.21
Bolivia	0.259*	3.825*	4.084	0.060	6.15
Columbia	5.631*	-2.009*	3.622	-0.403	-33.14
Ecuador				-4.024	-98.21
Peru	3.747*	4.375*	8.122	4.097	5917.36
Venezuela	4.196*	-1.392*	2.804	-1.220	-70.48

1.* and ** denote significant at 5% and 10% level of significance respectively.
2. Total effect is found by summing impact effects at the first stage and coefficient at second stage at 5% level of significance.
3. Net effect for each country is found by adding coefficient of RTA2 and each country coefficient.
4. Results are corrected for heteroscedasticity.
5. As the dependent variable appears as natural logarithm, net effect is also reported as [{Exp(net effect)}-1]*100 for interpretational convenience.
6. First stage is estimated using Tobit model while second stage is estimated using OLS. For first stage results, coefficients are not reported.