

IS SAARC REGION SUCCESSFUL IN PROMOTING INTRA-REGIONAL TRADE? EVIDENCE FROM BORDER EFFECT APPROACH

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Abstract: This paper considers the South Asian Association for Regional Cooperation (SAARC) and gravity model is used to analyze the border effect of the SAARC regional trade bloc for the year, 1985 to 2009 and also panel analysis by pooling dataset into five-year interval and according to its integration to South Asian Preferential Trading Arrangement (SAPTA) in 1995 and then to South Asian Free Trade Agreement (SAFTA) in 2006. The results of the trade relationship between SAARC region and other regions shows that the coefficients are positively significant, indicating that the SAARC region trades with the above 5 regions are active. It was unexpected that the empirical result shows that SAARC region trade is more active with the European region and the Pacific region than with the Asian region countries.

JEL classification codes: F1, R1

Keywords: SAARC; Border Effect

1. INTRODUCTION

One of the significant recent trends in the international trade has been the gaining importance of the regional trade blocs (RTBs). Even after the launch of the World Trade Organization (WTO) multilateral trading system, the RTBs continue to spread. Under the RTBs, member countries have the advantage over non-member countries in facing less trade barriers. But still, national border remains a question as a barrier to trade. It was believed that national borders diminish the volumes of trade. This issue was suggested by McCallum (1995) who using the 1988 data of Canada provinces and states of United States (U.S.), shows that Canada intra-provincial trade is 22 times larger than its trade with the U.S. A number of factors that might act as barriers to trade and could cause the volume of domestic trade to exceed that of international trade, such as tariffs, non-tariff barriers, a high elasticity of substitution between imports and domestic goods, etc. are termed as the "border effect". Since then, the border effect is given a great importance.

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South Asian countries also formed the South Asian Association for Regional Cooperation (SAARC) in 1985 with 7 members, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka, while Afghanistan joined in 2005 to become the 8th member. It was formed to accelerate the process of economic and social development in Member States. The SAARC countries share a lot of similarities in language, culture, and socio-economic conditions among themselves, which are beneficial to members in terms of trade, but they are all poor, developing countries and are less integrated among themselves, since there are political tension, conflicts and disputes among the SAARC members. SAARC region then formed the Agreement on South Asian Preferential Trading Arrangement (SAPTA) on 7th December, 1995, and later, the South Asian Free Trade Agreement (SAFTA) also came into being on 1st January, 2006. Thus, there is much dependency on trade which would trigger large border effect in SAARC region. While according to Anderson and Wincoop (2003), small economies have large border effect. SAARC region as a whole is a large economy. So, SAARC region must have a small border effect against rest of the world (RoW).

Thus, it isn't sure about how large or small is the border effect of the SAARC region against RoW and rest of regions, and the impact of SAPTA and SAFTA on trade. So, this paper tries to figure out the resulting border effect in the SAARC region.

There is no previous literature on border effect concerning the SAARC region, so this paper tries to investigate the border effect of the SAARC region and the degree of integration between the SAARC member countries and its non-member countries. The main purposes of this paper are: (1) To estimate the border effect of the SAARC region against RoW from 1985 to 2009, and then pooling the data into 5-year interval and also as according to the formation of SAPTA in 1995 and SAFTA in 2006, in order to analyze the border effect pattern of SAARC region with the signing of SAPTA and SAFTA; (2) To estimate region-wise border effect of the SAARC region separately against African region, American region, Asian region, European region, and Pacific region, respectively; and (3) To analyze the trade relationship between the SAARC region and other 5 regions, namely, 4 African Countries (Egypt, Kenya, South Africa, and Swaziland), 5 American Countries (Argentina, Brazil, Canada, United States, and Mexico), 9 Asian Countries (China, Indonesia, Iran, Japan, South Korea, Saudi Arabia, Singapore, Thailand, and United Arab Emirates), 8 European Countries (Belgium, France, Germany, Italy, Netherland, Spain, Switzerland, and United Kingdom), and 2 Pacific Countries (Australia and New Zealand), in order to find empirical evidence whether such trade relationship is active or not. Active means there is dependency of trade between SAARC region and other regions trade, i.e. gradually increase of trades with each other.

To achieve these objectives, the other parts of this paper are structured as follows: Section 2 introduces the literature reviews on relevant SAARC trade

and border effect studies. Section 3 discusses the empirical methodology on estimating the border effect of SAARC region and also its trade relationship with other regions. Section 4 discusses the empirical results. Lastly, concluding remarks in Section 5.

2. RESEARCH BACKGROUND

2.1. Reviews on SAARC using Gravity Model

Hassan (2001) was first to use gravity model in the study of SAARC trade using 27 countries cross-section data for the year 1996 and 1997. He finds low intra-SAARC trade and SAARC countries as a whole trade less internationally and also suggests that SAARC region were neither trade creating nor trade diverting. Hirantha (2004) uses both panel data and cross sectional data for the period from 1996 to 2002 to evaluate how trade between SAARC countries has changed over time from SAPTA to SAFTA using gravity model. She also finds that intra-SAARC and international trade has fallen. However, evidence show a significant trade creation effect under SAPTA and find no evidence of trade diversion effect with the rest of the world. Moktan (2009) instead uses the volume of export as gravity model dependent variable to examine the effect of trade agreement among SAARC countries and also examine whether intra-SAARC export trade had increased through the enforcement of SAPTA. He finds no indication of the effect of trade agreement on export for the pre-SAARC periods but the post-SAARC periods has a significant and positive effect. He further find that this positive effect of trade agreement on export resulted from the combined effect of the impact of SAPTA and also the late impact of the existing trade agreements.

2.2. Reviews of Border Effect Gravity Model

Ohmae (1990) made a statement about borderless world. In other words, national borders are less relevant than ever before because of the rise in growth of Preferential Trade Agreement during the end of 20th century. Similar to Tinbergen (1962), Linneman (1966), and Frankel (1993), McCallum (1995) then first introduced border effect of Canada and U.S. for the year 1988 and found Canada intra-provincial trade to be 22 times larger than trade between Canada and U.S. Since then, the issue of border effect had initiated many research works. Helliwell (1996) extended the estimated year from 1988 to 1996, and found little variations in the border effect and internal trade linkages are far stronger than was previously thought to be. Engel and Rogers (1996) instead use consumer price index (CPI) data of 14 U.S. and 9 Canadian cities for 14 categories of consumer goods to examine the nature of the deviations from the law of one price. Both distance and the border are found to be significant in explaining variation of price across locations. Hillberry

(1998) uses a special tabulation of the Commodity Flow Survey (CFS) to estimate the border effect from the U.S. side. It was surprising that he finds an estimate quite similar to McCallum (1995) aggregate border effect of 20.9, as the data were quite different. Anderson and wincoop (2003) using 1993 data and allowing for 'multilateral resistance' to vary significantly across regions, and found that the Canada and U.S. border effect is reduced to 10.5, while using the McCallum (1995) specification is 16.5. Feenstra (2002) also does the similar comparisons. Ceglowski (2000) uses the gravity model to investigate whether the impact of the Canada-US border on Canada's continental trading patterns from 1988 to 1996 has fallen since the Free Trade Area (FTA) and the North American Free Trade Area (NAFTA) went into effect in 1989 and 1994, respectively. It was found that Canadian provinces trade 21 times to 23 times more with one another than with US states. Rogers and Smith (2001) differs from Engel and Rogers (1996) with the addition of Mexico to estimate border effects on relative prices within the NAFTA countries. They found that over the sample period from 1980 to 1997, the border effect in U.S.-Mexican prices is larger than in Canadian prices-U.S.

Trefler (1995) shows how home bias helps to explain why internal trade within a country is more than international trade with other countries. Evidence of home bias is found in Canada-U.S. by McCallum (1995), Helliwell (1996) and Wall (2000); U.S. by Wolf (2000); Organization for Economic Cooperation and Development (OECD) by Wei (1996) and Evans (2003). Obstfeld and Rogoff (2001) identify home bias as a "border puzzle," one of the six major puzzles in international economics. Wolf (2000) finds that home bias is also present within U.S., and suggests the presence of other causes of excessive home trade.

Coming to border effect in European Countries, following Wei (1996) and Helliwell (1996), Nitsch (2000) estimated the impact of national border on countries within the European Union (EU) for a period from 1979 to 1990. He uses a different measure for estimating the average intra-national distances and found that although the EU is highly integrated, EU still trade about 7 to 10 times more internally than to its partner country. Head and Mayer (2000) also find that even after the virtual elimination of tariff and quotas in 1968 and the attempt to reduce NTBs between 1986 and 1992 through the Single Market Programme, borders still impacted trade within the EU.

Motivated by the likely causes of the border effect Chen (2004) uses the standard gravity equation model of 7 EU countries and 78 industries in the year 1996 and takes into account Wei (1996) and Leamer (1997) distance measure and her own weighted average measures using GDP weights. With her own method of distance measure; the border effect is found to be smaller than Wei (1996) and Leamer (1997) distance measure and EU country trades about 6 times more with itself than with foreign EU countries.

Olper and Raimondi (2008) use the gravity-border effect methodology to analyze the process and the level of agricultural trade integration between 22 OECD countries over 10 years, from 1994 to 2003. Their estimate of intra-national trade is more than 13 times that of trade with other OECD countries.

For Asian countries, Okubo (2004) analyze Japan's intra-regional trade for the period from 1960 to 1990, and find that the border effect in Japan to declined remarkably between 1960 and 1990 due to trade liberalization, reduction of tariff rates and NTBs, and the increases in the outward foreign direct investment (FDI). Fukao and Okubo (2004) uses gravity equation to analyze the causes of the decline in Japan's border effect from 1980 to 1995 for Japan's international and intra-regional trade in 4 machinery industries. Results show that in 1990, in the case of general machinery, intra-regional trade in Japan is more than 2.79 times the Japan's international trade; and in the case of transportation equipment, more than 4.60 times. While, in the case of electrical machinery and precision machinery, the estimated border effects from 1990 to 1995 are negative.

3. METHODOLOGY

Similar to McCallum (1995), this paper assume SAARC region to represent a country, where the 8 member countries bilateral trade among themselves are its domestic trade, while bilateral trade with the non-member countries are its international trade. So country border line is drawn around the SAARC countries. Data Sample consist of both bilateral exports and imports Standard International Trade Classification (SITC) Rev.1 data for the 8 SAARC countries bilateral pair observations and also bilateral pair observations between SAARC countries and 194 non-member countries over the period of 25 years, from 1985 to 2009. List of countries are shown in Appendix A. This paper used both the ordinary least squares (OLS) and random effect regression for empirical analysis.

In order to explore the impact of national borders of SAARC on trade flows through estimating the border effect of SAARC from 1985 to 2009, this paper set up a conventional Gravity Model of international trade and thus the Gravity Model used is the familiar log-linear-type function¹:

$$\text{Model I a : } \ln \text{Trade}_{ij} = \beta_1 + \beta_2 \ln \text{Gdp}_i + \beta_3 \ln \text{Gdp}_j + \beta_4 \ln \text{Dist}_{ij} + \beta_5 \text{Saarc}_{ij} + v_{ij} \quad (1)$$

Where, *i* denotes exporting country while *j* is importing country, and the variables are defined as: Trade_{ij} denotes bilateral trade between two countries, *i* and *j*; Gdp_i and Gdp_j denotes GDP of country *i* and *j*, respectively; Dist_{ij} denotes the distance between *i* and *j*; Saarc_{ij} is South Asian Association for Regional Cooperation border dummy variable, which is 1 if *i* and *j* are member of this agreement, and 0 otherwise; and v_{ij} denotes random error terms. The parameters to be estimated are denoted by β .

In order to allow for Panel regression, time-series and country and destination specific effects (v_{ijt}) are included to equation (1) to form Model I b:

$$\text{Model I b : } \ln\text{Trade}_{ijt} = \gamma_1 + \gamma_2 \ln\text{Gdp}_{it} + \gamma_3 \ln\text{Gdp}_{jt} + \gamma_4 \ln\text{Dist}_{ijt} + \gamma_5 \text{Saarc}_{ijt} + \mu_{ij} + v_{ijt} \quad (2)$$

Where, Trade_{ijt} , Gdp_{it} , Gdp_{jt} , and Dist_{ijt} variables only differ from the definition as defined in equation (1) with the inclusion of time variable (t).

Above Model I is to analyze the border effect of SAARC region against RoW, that is, how much times is the intra-SAARC region trade over its trade with RoW. This paper also analyzes region-wise SAARC border effect by dividing the RoW into 5 main regions, i.e. Africa, America, Asia, Europe, and Pacific². Thus the region-wise SAARC border effect gravity model and adding common border and language dummy variables, Model II are as given below:

$$\text{Model IIa : } \ln\text{Trade}_{ijt} = \eta_1 + \eta_2 \ln\text{Gdp}_{it} + \eta_3 \ln\text{Gdp}_{jt} + \eta_4 \ln\text{Dist}_{ijt} + \eta_5 \text{Contig}_{ijt} + \eta_6 \text{Lang}_{ijt} + \eta_7 \text{Saarc_Af}_{ijt} + \mu_{ij} + v_{ijt} \quad (3)$$

$$\text{Model IIb : } \ln\text{Trade}_{ijt} = \theta_1 + \theta_2 \ln\text{Gdp}_{it} + \theta_3 \ln\text{Gdp}_{jt} + \theta_4 \ln\text{Dist}_{ijt} + \theta_5 \text{Contig}_{ijt} + \theta_6 \text{Lang}_{ijt} + \theta_7 \text{Saarc_Am}_{ijt} + \mu_{ij} + v_{ijt} \quad (4)$$

$$\text{Model IIc : } \ln\text{Trade}_{ijt} = \lambda_1 + \lambda_2 \ln\text{Gdp}_{it} + \lambda_3 \ln\text{Gdp}_{jt} + \lambda_4 \ln\text{Dist}_{ijt} + \lambda_5 \text{Contig}_{ijt} + \lambda_6 \text{Lang}_{ijt} + \lambda_7 \text{Saarc_As}_{ijt} + \mu_{ij} + v_{ijt} \quad (5)$$

$$\text{Model IId : } \ln\text{Trade}_{ijt} = \rho_1 + \rho_2 \ln\text{Gdp}_{it} + \rho_3 \ln\text{Gdp}_{jt} + \rho_4 \ln\text{Dist}_{ijt} + \rho_5 \text{Contig}_{ijt} + \rho_6 \text{Lang}_{ijt} + \rho_7 \text{Saarc_Eu}_{ijt} + \mu_{ij} + v_{ijt} \quad (6)$$

$$\text{Model IIe : } \ln\text{Trade}_{ijt} = \tau_1 + \tau_2 \ln\text{Gdp}_{it} + \tau_3 \ln\text{Gdp}_{jt} + \tau_4 \ln\text{Dist}_{ijt} + \tau_5 \text{Contig}_{ijt} + \tau_6 \text{Lang}_{ijt} + \tau_7 \text{Saarc_Pa}_{ijt} + \mu_{ij} + v_{ijt} \quad (7)$$

Where, Trade_{ijt} , Gdp_{it} , Gdp_{jt} , and Dist_{ijt} variables are similar to as defined in equation (2); Contig_{ijt} is a dummy variable which is 1 if i and j share a common border, and 0 otherwise; Lang_{ijt} is a dummy variable which is 1 if i and j share a common language, and 0 otherwise; Saarc_Af_{ijt} , Saarc_Am_{ijt} , Saarc_As_{ijt} , Saarc_Eu_{ijt} , and Saarc_Pa_{ijt} are the border dummy variable, which is 1 if i and j belongs to the SAARC region, and 0, if i or j belongs to an African region, American region, Asian region, European region, and Pacific region, respectively.

This paper also analyze the impact on trade relationship between SAARC countries and 4 African Countries, 5 American Countries, 9 Asian Countries, 8 European Countries, and 2 Pacific Countries³. Replacing the SAARC border dummy variable of Model I by dummy variables of African Countries, American Countries, Asian Countries, European Countries, and Pacific Countries, respectively; Model III is formed and is given below:

$$\text{Model III: } \ln\text{Trade}_{ijt} = \delta_1 + \delta_2 \ln\text{Gdp}_{it} + \delta_3 \ln\text{Gdp}_{jt} + \delta_4 \ln\text{Dist}_{ijt} + \delta_5 \text{Contig}_{ijt} + \delta_6 \text{Lang}_{ijt} + \delta_7 \text{S_Africa}_{ijt} + \delta_8 \text{S_America}_{ijt} + \delta_9 \text{S_Asia}_{ijt} + \delta_{10} \text{S_Europe}_{ijt} + \delta_{11} \text{S_Pacific}_{ijt} + \mu_{ij} + v_{ijt} \quad (8)$$

Where, S_Africa_{ijt} , S_America_{ijt} , S_Asia_{ijt} , S_Europe_{ijt} , and S_Pacific_{ijt} are dummy variables, which is 1 if i (j) is SAARC countries and j (i) are the 4 African countries, 5 American countries, 9 Asian countries, 8 European countries, and 2 Pacific countries, respectively; and 0 otherwise.

4. EMPIRICAL RESULTS

OLS regression are used in Model I a for cross-sectional analysis of the border effect, while in case of Model I b, Model II, and Model III, panel random effect regressions are used for five-year interval and also according to its integration⁴.

4.1. The Border Effect of SAARC Region

Firstly, Table 1 shows the empirical results of model I a using OLS regression of the year from 1985 to 2009. The result of the basic gravity model variables are all significant and have shown expected signs.

The SAARC border dummy variable is the main variable of interest in this paper. Since the border effect of SAARC region is calculated using the coefficient of this border dummy variable, which will be discussed below. The coefficients of SAARC dummy variable are positive except for the year: 1985, 1987, 1988, 1989, and 1990 which are negative and only significant for the year: 1992 to 1999, 2003, 2006, 2008, and 2009. The significant SAARC border dummy coefficients are all positive and tend to be of increasing trend⁵. But there are conflicting results, as for the comparisons of the significant year SAARC border dummy's coefficient between 1994 and 1995; The SAARC border dummy's coefficient for the year 1994 (1.29) is greater than the coefficient for the year 1995 (0.61), but testing the SAARC border dummy's coefficient using Wald test, indicate opposite relationship, i.e. the SAARC border dummy's coefficient for the year 1994 is less than the coefficient for the year 1995. Similarly, comparison between 1996 and 1997; 1998 and 1999; and 2003 and 2006, also has conflicting relationship.

According to many literatures such as McCallum (1995), Ceglowski (2000), Nitsch (2000), Okubo (2004), etc., the border effect is calculated through exponential of the coefficient of the country or region dummy variable⁶. That is:

$$\text{Border effect (times)} = \exp [\text{significant coefficient of border variable}]^7$$

Where, border effect denotes how much times the bilateral trade within a country or region greater than its international trade, which also indicate that with

Table 1
Model I a's cross-sectional OLS results (1985-2009): The case of intra-SAARC and RoW

Explained Variable: lnTrade _{ij}	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
lnGdp_i	0.93*** (21.84)	0.94*** (23.85)	0.95*** (24.26)	0.93*** (23.51)	0.96*** (24.58)	0.97*** (27.06)	1.05*** (31.63)	1.04*** (29.89)	1.10*** (33.64)	1.10*** (28.91)	1.15*** (31.54)	1.12*** (34.97)	1.10*** (35.22)
lnGdp_j	0.89*** (22.16)	0.88*** (23.80)	0.88*** (23.79)	0.87*** (23.87)	0.84*** (22.95)	0.85*** (25.69)	0.85*** (28.76)	0.91*** (29.19)	0.89*** (30.49)	0.92*** (28.32)	0.89*** (28.00)	0.84*** (28.20)	0.85*** (28.53)
lnDist_{ij}	-1.53*** (-11.38)	-1.39*** (-11.09)	-1.36*** (-10.67)	-1.50*** (-11.94)	-1.50*** (-12.00)	-1.33*** (-11.46)	-1.31*** (-12.10)	-0.99*** (-8.94)	-1.03*** (-10.07)	-0.90*** (-7.09)	-1.14*** (-9.85)	-1.02*** (-9.65)	-1.06*** (-10.10)
Saarc_{ij}	-0.38 (-0.96)	0.02 (0.06)	-0.18 (-0.46)	-0.36 (-0.94)	-0.25 (-0.64)	-0.21 (-0.60)	0.03 (0.11)	0.61* (1.80)	0.96*** (2.98)	1.29*** (3.25)	0.61* (1.71)	0.89*** (2.58)	0.74** (2.22)
_cons	-15.81*** (-8.07)	-16.92*** (-9.28)	-17.78*** (-9.59)	-15.64*** (-8.41)	-15.79*** (-8.53)	-17.74*** (-10.56)	-19.70*** (-12.85)	-23.68*** (-14.71)	-24.67*** (-16.20)	-26.47*** (-14.81)	-24.98*** (-14.84)	-24.08*** (-15.31)	-23.47*** (-15.10)
Border Effect^a	-	-	-	-	-	-	-	1.84	2.62	3.63	1.83	2.43	2.10
Adjusted R²	0.51	0.54	0.53	0.57	0.57	0.57	0.60	0.57	0.59	0.61	0.58	0.61	0.61
F-value	240.22	282.63	275.97	292.57	296.15	343.28	406.98	371.99	443.32	334.53	348.49	415.30	425.35
Observations	923	958	982	890	906	1029	1075	1109	1228	865	992	1075	1099

^a Border effect (times) = exp(the significant coefficient of Saarc_{ij}).

***, ** and * significant at the 1%, 5% level and 10% levels, respectively; t - values in brackets.

Table 1 (continued)
Model I a's cross-sectional OLS results (1985-2009): The case of intra-SAARC and RoW

Explained Variable: lnTrade _{ij}	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Explanatory Variables												
lnGdp _i	1.11*** (35.67)	1.13*** (36.59)	1.14*** (36.57)	1.10*** (36.08)	1.15*** (37.32)	1.15*** (40.51)	1.11*** (39.47)	1.20*** (44.65)	1.17*** (44.71)	1.24*** (44.01)	1.24*** (41.90)	1.32*** (44.92)
lnGdp _j	0.85*** (29.68)	0.82*** (30.24)	0.87*** (28.26)	0.82*** (28.87)	0.88*** (30.03)	0.88*** (32.85)	0.88*** (32.96)	0.90*** (35.26)	0.99*** (40.23)	0.96*** (35.58)	0.94*** (33.98)	0.97*** (34.27)
lnDist _{ij}	-1.07*** (-10.40)	-1.18*** (-11.54)	-1.09*** (-10.18)	-1.07*** (-10.66)	-1.05*** (-10.04)	-1.07*** (-10.93)	-1.12*** (-11.14)	-1.17*** (-11.51)	-1.02*** (-10.53)	-1.14*** (-10.65)	-1.15*** (-10.64)	-0.94*** (-8.83)
Saarc _{ij}	0.82*** (2.46)	0.68** (2.11)	0.28 (0.78)	0.35 (1.06)	0.52 (1.49)	0.83** (2.49)	0.51 (1.43)	0.51 (1.58)	0.74** (2.35)	0.21 (0.61)	0.95*** (2.68)	1.16*** (3.29)
_cons	-23.81*** (-15.69)	-22.26*** (-15.04)	-24.80*** (-15.45)	-22.42*** (-14.93)	-25.43*** (-16.34)	-25.27*** (-17.53)	-24.01*** (-16.16)	-26.43*** (-17.99)	-29.22*** (-20.76)	-29.33*** (-18.85)	-28.99*** (-18.47)	-33.89*** (-21.58)
Border Effect ^a	2.27	1.96	-	-	-	2.30	-	-	2.09	-	2.58	3.17
Adjusted R ²	0.59	0.61	0.60	0.59	0.59	0.60	0.613	0.64	0.65	0.63	0.64	0.64
F-value	426.16	466.62	442.47	463.27	498.43	601.45	596.00	706.98	763.87	691.37	597.50	696.99
Observations	1160	1180	1190	1295	1374	1620	1502	1610	1617	1625	1372	1536

^a Border effect (times) = exp(the significant coefficient of Saarc_{ij}).

***, ** and * significant at the 1%, 5% level and 10% levels, respectively; t-values in brackets.

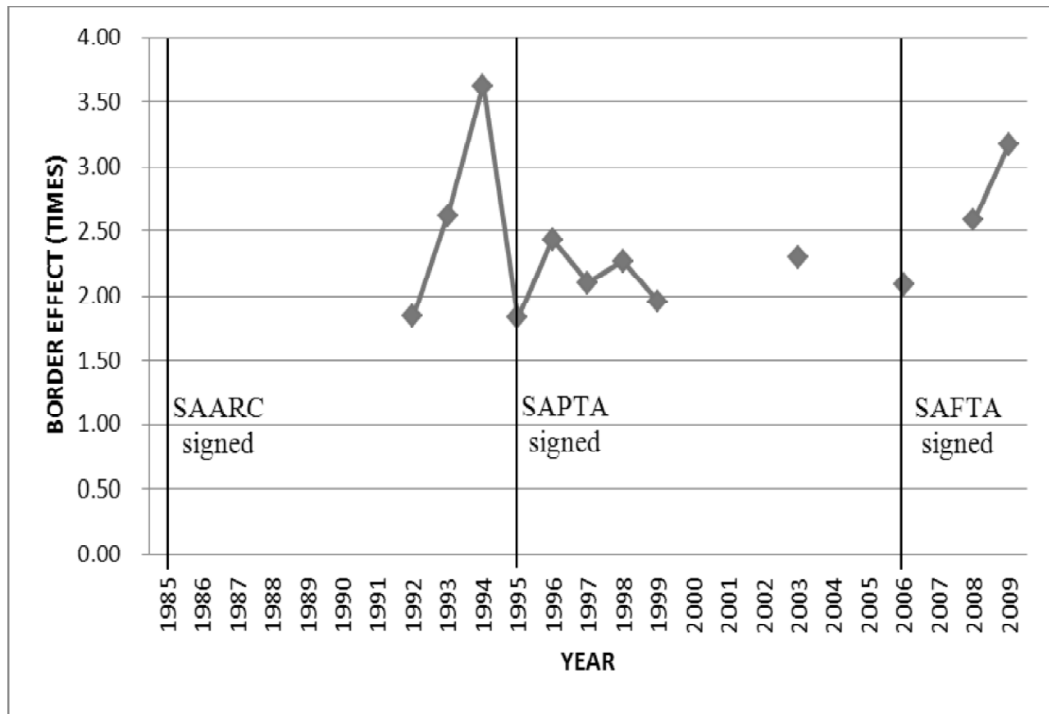


Figure 1. Model I a's border effect of SAARC region using OLS: The case of intra-SAARC and RoW

trade agreement such as Free Trade Agreement, the countries or region within the trade agreement has the privileges of lessening trade barriers among themselves, so there is more trade barriers for countries or region outside the trade agreement.

The border effects of the SAARC region is calculated according to the above formula and are as shown Table 1. The significant border effects of SAARC region against RoW are between 1.83 to 3.63 times. Thus the border effect exists in SAARC region. Even though the border effect of SAARC is quite small to that of McCallum (1995) Canada-U.S. border effect of 22 times, border barriers has caused its internal trade to be greater than that of its international trade.

Table 2 shows the panel random effects regression of Model I b for five-year interval. The coefficients of SAARC dummy variable are positive and significance at 1% and 5% level, except for 1985~1989 which is negative and not significant⁸. The significant border effect of SAARC border dummy variable from 1990~1994 to 2005~2009 are 2.53, 2.49, 1.83, and 1.83, respectively and the border effect trend are as shown in fig. 2. While testing Wald test there is a conflicting result while

Table 2
Gravity Model Panel Random-Effects results: Five-year interval

Explained Variable: $\ln\text{Trade}_{ijt}$					
Explanatory Variables	1985~1989	1990~1994	1995~1999	2000~2004	2005~2009
$\ln\text{Gdp}_{it}$	0.93*** (29.12)	1.08*** (39.79)	1.12*** (44.82)	1.15*** (48.53)	1.18*** (51.50)
$\ln\text{Gdp}_{jt}$	0.82*** (27.26)	0.88*** (35.12)	0.85*** (36.01)	0.89*** (38.77)	0.87*** (39.31)
$\ln\text{Dist}_{ijt}$	-1.37*** (-12.30)	-0.94*** (-10.44)	-1.01*** (-11.61)	-1.09*** (-12.41)	-1.11*** (-12.33)
Saarc_{ijt}	-0.02 (-0.05)	0.93*** (3.12)	0.91*** (3.27)	0.60** (2.00)	0.60** (2.07)
_cons	-15.98*** (-10.30)	-24.71*** (-19.02)	-24.42*** (-19.45)	-25.63*** (-20.59)	-26.30*** (-21.05)
Border Effect ^a	-	2.53	2.49	1.83	1.83
R^2	0.54	0.59	0.60	0.60	0.63
Chi^2	1683.43	2485.61	2780.79	3491.04	3916.13
Observations	4659	5306	5506	6981	7760

^a Border effect (times) = $\exp(\text{the significant coefficient of Saarc}_{ij})$.

***, ** and *significant at the 1%, 5% level and 10% levels, respectively.

t - values in brackets.

Source: This study

comparing coefficient of SAARC dummy variable between 1990~1994 and 1995~1999, as the coefficient between the two tends to decrease but Wald test indicate that it is actually increasing.

Overall the result of the border effects of SAARC region using panel random effects regression on Model I a, are also quite small, and are gradually decline and then increase as according to Wald test. So it can be seen that there is little impact of further integration of SAARC to SAPTA in 1995 and then to SAFTA in 2006 on the internal trade between SAARC countries.

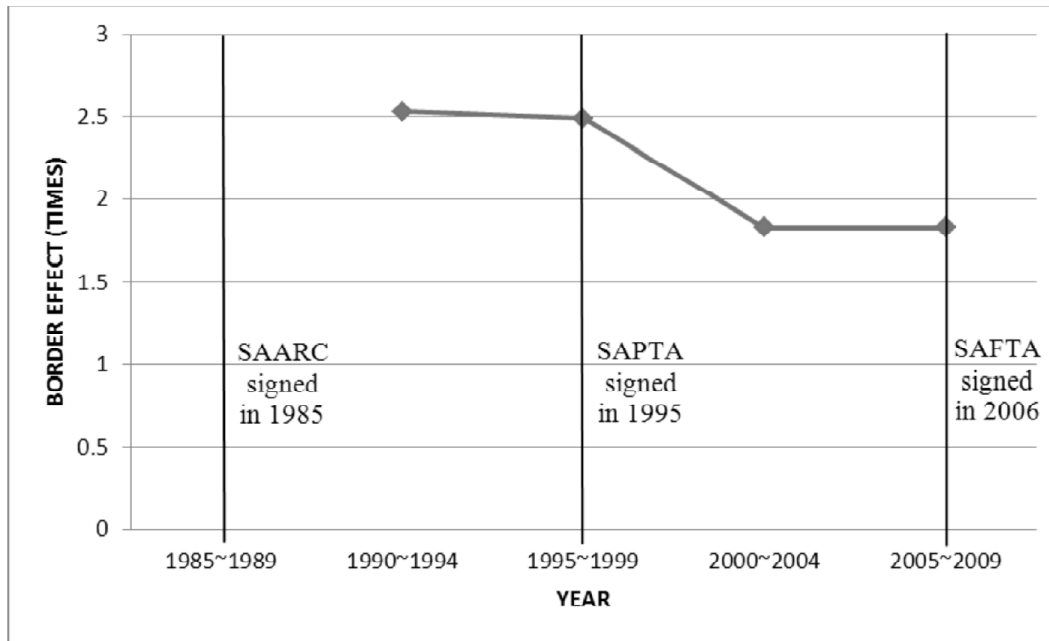


Figure 2: Five-year interval border effect of SAARC using Panel Random-Effects:
The case of intra-SAARC and RoW

Table 3 shows the Panel Random-Effects regression of Model I b as according to SAARC integration. The coefficient of SAARC are positive and significance at 1% level, except for 2006~2009 which is significance at 5% level⁹. The significant border effect of SAARC have decreased from 2.41 times for 1985~1995 to 1.89 times for 1996~2006 and increase to 1.97 times for 2006~2009, as shown in Figure 3. Thus SAPTA in 1995 and SAFTA in 2006 have little impact on internal trade of SAARC countries. But Wald test states otherwise, its results show that the coefficients of the SAARC dummy are of increasing trend. In other words, the border effects of SAARC are increasing.

As discussed earlier, Model I is used to analyze the border effect of SAARC region, that cause the intra-SAARC region trade to be over its trade with the RoW, while Model II break up the RoW into African, American, Asian, European, and Pacific region. The empirical results of Model II are as follows:

Table 4. shows the Model II a's panel random-effects result as according to five-year interval. The coefficient of Saarc_Af are positively significant for the periods 1985~1989 to 1995~1999 and the coefficient are declining¹⁰. So the border effect for the periods, 1985~1989 to 1995~1999 are 8.25, 5.21, and 3.03 times, respectively. The SAARC region internal trade in 1985~1989 is more than 8.25 times than that of it trade with African region and drop to 3.03 times in 1995~1999.

Table 3
Model I b's Panel Random-Effects results as according to SAARC integration:
The case of intra-SAARC and RoW

Explained Variable: $\ln Trade_{ijt}$				
Explanatory Variables	1985~1995	1996~2005	2006~2009	1985~2009
$\ln Gdp_{it}$	1.00*** (43.83)	1.13*** (54.82)	1.22*** (50.81)	0.98*** (67.24)
$\ln Gdp_{jt}$	0.85*** (39.75)	0.86*** (43.41)	0.91*** (39.28)	0.75*** (52.67)
$\ln Dist_{ijt}$	-1.01*** (-11.43)	-1.12*** (-13.60)	-1.08*** (-11.81)	-1.16*** (-15.31)
$Saarc_{ijt}$	0.88*** (3.05)	0.64*** (2.66)	0.68** (2.28)	0.41** (2.15)
_cons	-21.72*** (-18.93)	-24.41*** (-22.66)	-28.54*** (-21.91)	-17.95*** (-22.88)
Border Effect ^a	2.41	1.89	1.97	1.51
R ²	0.56	0.61	0.64	0.59
Observations	10957	13105	6150	30212

^a Border effect (times) = exp(the significant coefficient of $Saarc_{ijt}$).

***, ** and *significant at the 1%, 5% level and 10% levels, respectively.
 z-values in brackets.

But Wald test show that the border effect is increasing, which indicate that trade of SAARC region with the African region are declining.

Table 4 also shows the Model IIa's panel random-effects result as according to SAARC integration to SAPTA and SAFTA. The coefficient of $Saarc_Af$ are only positively significant for the periods 1985~1995 and the SAARC-African border effect is 5.64 times.

Table 5 shows the Model IIb's panel random-effects result as according to five-year interval. The coefficient of $Saarc_Am$ border dummy are positively significant for the periods 1985~1989 and 1990~1994 and had declined¹¹. The border effect for

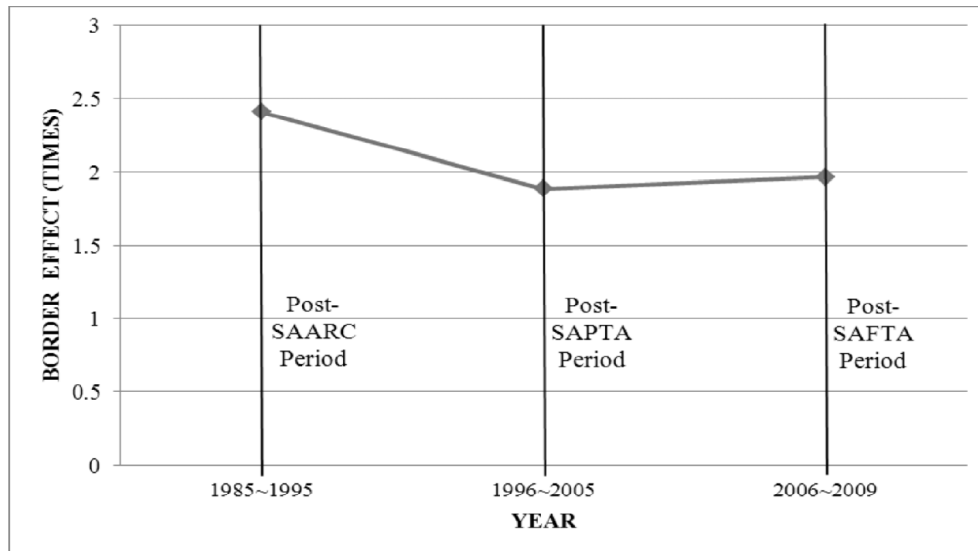


Figure 3: Border effect of SAARC as according to SAARC integration using Panel Random-Effects: The case of intra-SAARC and RoW

Table 4
Model II a's Panel Random-Effects results as according to Five-year interval and SAARC integration: The case of intra-SAARC and African region

Explained Variable: lnTrade _{ijt}									
Explanatory Variables	Five-year interval					SAARC integration			1985~2009
	1985~1989	1990~1994	1995~1999	2000~2004	2005~2009	1985~1995	1996~2005	2006~2009	
lnGdp _{it}	0.80*** (11.64)	0.95*** (15.41)	1.04*** (17.75)	1.18*** (22.20)	1.14*** (21.43)	0.93*** (18.43)	1.13*** (25.43)	1.18*** (20.74)	1.02*** (34.76)
lnGdp _{jt}	0.63*** (9.18)	0.67*** (11.20)	0.77*** (13.57)	0.91*** (17.52)	0.84*** (16.01)	0.70*** (14.15)	0.87*** (20.18)	0.88*** (15.78)	0.76*** (25.88)
lnDist _{ijt}	-0.28 (-0.75)	-0.48 (-1.62)	-0.82*** (-2.86)	-1.21*** (-4.20)	-1.06*** (-3.54)	-0.54** (-1.98)	-1.31*** (-5.15)	-0.97*** (-3.16)	-1.09*** (-4.48)
Contig _{ijt}	-0.23 (-0.29)	0.21 (0.34)	0.20 (0.33)	-0.62 (-0.91)	1.12 (1.59)	0.08 (0.13)	0.08 (0.13)	1.07 (1.50)	0.75 (1.33)
Lang _{ijt}	1.06*** (3.37)	1.27*** (4.52)	1.28*** (4.61)	0.80*** (3.20)	1.37*** (4.56)	1.22*** (4.61)	0.93*** (3.79)	1.31*** (4.26)	1.27*** (5.29)
Saarc_Af _{ijt}	2.11*** (3.28)	1.65*** (2.93)	1.11** (2.12)	0.33 (0.64)	0.26 (0.47)	1.73*** (3.37)	0.32 (0.69)	0.37 (0.67)	0.54 (1.23)
_cons	-18.44*** (-4.63)	-21.00*** (-6.30)	-22.54*** (-6.78)	-25.44*** (-8.10)	-24.79*** (-7.60)	-20.81*** (-7.14)	-22.82*** (-8.50)	-27.71*** (-8.14)	-19.81*** (-8.66)
Border Effect ^a	8.25	5.21	3.03	-	-	5.64	-	-	-
R ²	0.35	0.46	0.50	0.51	0.55	0.41	0.51	0.55	0.48
Observations	1387	1460	1413	1932	2145	3109	3545	1683	8337

^a Border effect (times) = exp(the significant coefficient of Saarc_Af_{ijt}).

***, ** and *significant at the 1%, 5% level and 10% levels, respectively; z-values in brackets.

the periods, 1985~1989 and 1990~1994 are 58.56 times and 23.81 times, respectively. The border effect of SAARC region is quite large in respect of trade with American region. But Wald test indicate that the border effect of SAARC region have increased, as SAARC region trade with American region are declining.

Table 5 also shows the Model II b's panel random-effects result as according to SAARC's integration to SAPTA and SAFTA. The coefficient of Saarc_Am are only positively significant for the periods 1985~1995 and the SAARC-American border effect is 15.96 times.

Table 5
Model II b's Panel Random-Effects results as according to Five-year interval and SAARC integration: The case of intra-SAARC and American region

Explained Variable: lnTrade _{ijt}									
Explanatory Variables	Five-year interval					SAARC integration			1985~2009
	1985~1989	1990~1994	1995~1999	2000~2004	2005~2009	1985~1995	1996~2005	2006~2009	
lnGdp _{it}	0.80*** (13.25)	1.00*** (20.95)	1.00*** (21.27)	1.11*** (24.44)	1.12*** (25.77)	0.95*** (22.35)	1.03*** (26.06)	1.16*** (26.06)	0.99*** (35.27)
lnGdp _{jt}	0.73*** (13.27)	0.80*** (18.24)	0.73*** (16.39)	0.82*** (18.44)	0.86*** (20.36)	0.82*** (20.38)	0.80*** (21.00)	0.89*** (20.44)	0.81*** (29.61)
lnDist _{ijt}	0.35 (0.68)	-0.08 (-0.23)	-1.37*** (-3.98)	-1.51*** (-3.70)	-0.98*** (-2.69)	-0.28 (-0.79)	-1.52*** (-4.65)	-0.91** (-2.47)	-1.16*** (-3.75)
Contig _{ijt}	0.39 (0.48)	0.40 (0.74)	0.51 (0.86)	-0.25 (-0.37)	1.34** (2.05)	0.32 (0.56)	0.48 (0.83)	1.29** (1.97)	0.92* (1.68)
Lang _{ijt}	-0.25 (-0.68)	-0.14 (-0.48)	-0.49* (-1.69)	-0.13 (-0.49)	0.39 (1.38)	-0.23 (-0.81)	-0.08 (-0.34)	0.34 (1.20)	-0.01 (-0.06)
Saarc_Am _{ijt}	4.07*** (3.47)	3.17*** (3.84)	-0.01 (-0.00)	-0.09 (-0.10)	0.76 (0.89)	2.77*** (3.30)	-0.23 (-0.30)	0.95 (1.10)	0.48 (0.68)
_cons	-27.56*** (-5.26)	-29.57*** (-8.41)	-15.67*** (-4.32)	-19.19*** (-4.55)	-25.92*** (-6.73)	-27.00*** (-7.60)	-16.79*** (-4.94)	-28.49*** (-7.31)	-19.62*** (-6.40)
Border Effect ^a	58.56	23.81	-	-	-	15.96	-	-	-
R ²	0.55	0.62	0.63	0.62	0.66	0.59	0.62	0.66	0.61
Observations	1170	1292	1287	1631	1868	2678	3092	1478	7248

^a Border effect (times) = exp(the significant coefficient of Saarc_Am_{ijt}).

***, ** and *significant at the 1%, 5% level and 10% levels, respectively; z-values in brackets.

Table 6 shows the Model IIc's panel random-effects result as according to five-year interval. The coefficient of Saarc_As are positively significant for the periods 1985~1989 to 2000~2004 and the coefficient are declining¹². So the border effect for the periods, 1985~1989 to 1995~1999 are 2.14, 5.37, 2.51, and 1.79 times, respectively. Since SAARC region is a part of Asia, it would naturally trade more with Asian region. Thus, as expected the SAARC-Asian border effect is smaller than with that

of other region, and had also decline on account of increasing trade of SAARC region with the Asian region.

Table 6 also shows the Model II *c*'s panel random-effects result as according to SAARC's integration to SAPTA and SAFTA. The coefficient of Saarc_A_s are only positively significant for the periods 1985~1995 and 1996~2005, and the border effect are 4.06 and 1.65 times, respectively. Overall, for the period 1985~2009, the SAARC-Asian border effect is 1.40 times.

Table 6
Model II *c*'s Panel Random-Effects results as according to Five-year interval and SAARC integration: The case of intra-SAARC and Asian region

Explained Variable: lnTrade _{ijt}									
Explanatory Variables	Five-year interval					SAARC integration			1985~2009
	1985~1989	1990~1994	1995~1999	2000~2004	2005~2009	1985~1995	1996~2005	2006~2009	
lnGdp _{it}	1.15*** (15.47)	1.19*** (19.80)	1.32*** (24.36)	1.34*** (25.16)	1.22*** (25.60)	1.06*** (21.97)	1.26*** (29.32)	1.29*** (25.36)	0.99*** (34.27)
lnGdp _{jt}	0.90*** (12.08)	0.97*** (16.98)	0.92*** (18.47)	0.88*** (17.31)	0.76*** (16.66)	0.87*** (19.04)	0.84*** (20.37)	0.84*** (17.45)	0.66*** (23.20)
lnDist _{ijt}	-0.62* (-1.89)	-0.16 (-0.66)	-1.27*** (-5.70)	-1.15*** (-5.00)	-1.13*** (-5.05)	-0.31 (-1.26)	-1.32*** (-6.38)	-1.17*** (-5.16)	-0.98*** (-5.02)
Contig _{ijt}	-0.79 (-1.40)	0.01 (0.00)	-0.24 (-0.53)	-0.06 (-0.13)	0.99** (2.27)	0.09 (0.18)	-0.08 (-0.17)	0.86* (1.95)	0.95** (2.30)
Lang _{ijt}	0.06 (0.11)	0.26 (0.46)	0.09 (0.17)	0.37 (0.66)	1.04* (1.83)	0.52 (0.90)	0.60 (1.11)	0.79 (1.36)	1.39*** (2.57)
Saarc_A _{sijt}	0.76* (1.78)	1.68*** (4.52)	0.92*** (2.78)	0.58* (1.69)	0.29 (0.89)	1.40*** (3.79)	0.50* (1.93)	0.38 (1.14)	0.34* (1.74)
_cons	-28.92*** (-8.76)	-35.74*** (-13.59)	-28.72*** (-11.71)	-29.66*** (-11.67)	-24.30*** (-10.31)	-29.07*** (-12.28)	-25.37*** (-12.20)	-27.84*** (-11.32)	-17.45*** (-10.62)
Border Effect ^a	2.14	5.37	2.51	1.79	-	4.06	1.65	-	1.40
R ²	0.47	0.53	0.59	0.58	0.62	0.49	0.59	0.63	0.54
Observations	1373	1610	1694	1928	2130	3301	3734	1700	8735

^a Border effect (times) = exp(the significant coefficient of Saarc_A_{sijt}).

***, ** and *significant at the 1%, 5% level and 10% levels, respectively; z-values in brackets.

Table 7 shows the Model II *d*'s panel random-effects result as according to five-year interval. The coefficients of Saarc_Eu are positively significant for all periods and the coefficient are declining¹³. The border effect for the periods, 1985~1989 to 2005~2009 are 7.10, 17.81, 8.00, 6.42, and 7.10 times, respectively. Thus the SAARC-European border effects are gradually declining and then had increased.

Table 7 also shows the Model II d's panel random-effects result as according to SAARC's integration to SAPTA and SAFTA. The coefficient of Saarc_Eu are positively significant for all periods from 1985~1995 to 2006~2009, and the SAARC-Pacific border effect are 14.3, 3.78, 8.33 times, respectively and had declined then increased. Overall, for the period 1985~2009, the SAARC-Pacific border effect is 3.32 times.

Table 7
Model II d's Panel Random-Effects results as according to Five-year interval and SAARC integration: The case of intra-SAARC and European region

Explained Variable: lnTrade _{ijt}									
Explanatory Variables	Five-year interval					SAARC integration			1985~2009
	1985~1989	1990~1994	1995~1999	2000~2004	2005~2009	1985~1995	1996~2005	2006~2009	
lnGdp _{it}	1.03*** (17.81)	1.15*** (23.96)	1.25*** (29.68)	1.26*** (28.36)	1.33*** (31.91)	1.01*** (25.65)	1.21*** (32.72)	1.36*** (31.15)	0.86*** (32.13)
lnGdp _{jt}	0.86*** (15.08)	1.00*** (22.29)	0.98*** (24.82)	1.03*** (24.90)	0.98*** (24.61)	0.92*** (24.54)	0.94*** (26.68)	1.02*** (24.52)	0.74*** (28.16)
lnDist _{ijt}	-0.07 (-0.21)	0.08 (0.27)	-0.66*** (-2.57)	-0.78** (-2.53)	-0.56** (-2.01)	0.07 (0.24)	-1.12*** (-4.13)	-0.48* (-1.72)	-0.63** (-2.29)
Contig _{ijt}	-0.66 (-1.01)	-0.16 (-0.29)	-0.13 (-0.25)	-0.48 (-0.77)	1.18** (2.00)	0.09 (0.16)	0.20 (0.35)	1.17** (1.96)	1.53*** (2.62)
Lang _{ijt}	-0.05 (-0.11)	0.07 (0.15)	-0.17 (-0.37)	-0.10 (-0.19)	-0.02 (-0.03)	0.23 (0.46)	-0.01 (-0.01)	-0.20 (-0.36)	0.91* (1.66)
Saarc_Eu _{ijt}	1.96*** (3.48)	2.88*** (5.79)	2.08*** (4.75)	1.86*** (3.75)	1.96*** (4.25)	2.66*** (5.36)	1.33*** (2.95)	2.12*** (4.52)	1.20*** (2.69)
_cons	-30.32*** (-8.34)	-38.48*** (-12.95)	-34.14*** (-12.45)	-35.03*** (-11.15)	-38.07*** (-12.82)	-33.11*** (-11.65)	-28.49*** (-10.48)	-40.79*** (-13.40)	-19.75*** (-7.84)
Border Effect ^a	7.10	17.81	8.00	6.42	7.10	14.30	3.78	8.33	3.32
R ²	0.60	0.64	0.70	0.68	0.69	0.61	0.68	0.69	0.62
Observations	1202	1492	1644	1913	2142	2999	3688	1706	8393

^a Border effect (times) = exp(the significant coefficient of Saarc_Eu_{ijt}).

***, ** and *significant at the 1%, 5% level and 10% levels, respectively; z-values in brackets.

Table 8 shows the Model IIe's panel random-effects result as according to five-year interval. The coefficient of Saarc_Pa are positively significant for the periods 1985~1989 to 1990~1994 and the coefficient are declining¹⁴. So the SAARC-Pacific border effect for the periods, 1985~1989 to 1990~1994 are 13.46 and 5.26 times, respectively. But Wald test indicate that the SAARC-Pacific border effect had increased, bilateral trade between SAARC region and Pacific region had decreased.

Table 8 also shows the Model II e's panel random-effects result as according to SAARC's integration to SAPTA and SAFTA. The coefficient of Saarc_Pa are only

positively significant for the periods 1985~1995 and thus, the SAARC-Pacific border effect are 4.39 times.

Table 8
Model II e's Panel Random-Effects results as according to Five-year interval and SAARC integration: The case of intra-SAARC and Pacific region

Explained Variable: $\ln Trade_{ijt}$									
Explanatory Variables	Five-year interval					SAARC integration			1985~2009
	1985~1989	1990~1994	1995~1999	2000~2004	2005~2009	1985~1995	1996~2005	2006~2009	
$\ln GDP_{it}$	0.83*** (9.44)	0.95*** (11.79)	0.95*** (12.74)	0.92*** (12.60)	1.00*** (15.57)	0.91*** (14.26)	0.86*** (14.49)	1.03*** (15.30)	0.77*** (19.66)
$\ln GDP_{jt}$	0.84*** (10.79)	0.87*** (11.60)	0.85*** (11.59)	0.82*** (11.52)	0.77*** (12.16)	0.83*** (13.69)	0.73*** (12.46)	0.81*** (12.13)	0.62*** (15.99)
$\ln Dist_{ijt}$	0.47 (0.95)	-0.03 (-0.08)	-1.25*** (-3.30)	-1.52*** (-3.35)	-1.14*** (-2.99)	-0.19 (-0.50)	-1.45*** (-4.09)	-1.07*** (-2.72)	-1.10*** (-3.26)
$Contig_{ijt}$	0.25 (0.31)	0.49 (0.73)	0.39 (0.58)	0.02 (0.03)	1.67** (2.35)	0.47 (0.74)	0.91 (1.40)	1.61** (2.23)	1.70*** (2.74)
$Lang_{ijt}$	-0.41 (-0.83)	-0.45 (-0.97)	-0.11 (-0.25)	0.18 (0.43)	0.01 (0.01)	-0.37 (-0.86)	0.21 (0.57)	-0.04 (-0.10)	0.10 (0.29)
Saarc_Pa _{ijt}	2.60*** (2.56)	1.66* (1.85)	-0.59 (-0.73)	-0.88 (-0.95)	-0.01 (-0.01)	1.48* (1.84)	-0.55 (-0.74)	0.16 (0.20)	0.10 (0.15)
_cons	-30.05*** (-5.96)	-29.01*** (-6.97)	-17.25*** (-4.23)	-13.97*** (-3.01)	-18.86*** (-4.60)	-25.76*** (-6.93)	-11.36*** (-3.06)	-21.46*** (-5.10)	-10.06*** (-3.07)
Border Effect ^a	13.46	5.26	-	-	-	4.39	-	-	-
R ²	0.59	0.62	0.63	0.59	0.65	0.60	0.60	0.66	0.57
Observations	479	552	568	657	843	1134	1302	663	3099

^a Border effect (times) = exp(the significant coefficient of Saarc_Pa_{ijt}).

***, ** and *significant at the 1%, 5% level and 10% levels, respectively; z-values in brackets.

Fig. 4. and Fig. 5., Shows the region-wise border effect of SAARC region as according to five-year interval and SAARC integration. The border effect of SAARC region is smaller in respect to Asian region, followed by African region, Pacific region, European region and lastly, American region. As trade cost increases with distance between the trading countries, so as expected SAARC region would trade more with nearby Asian region and thus the border effect would be smaller. With the globalization taking place all over the world, many barriers to international trade such as tariffs, export fees, and import quotas are reduced. So also is the gradual decline and increase in the border effect of SAARC region in respect of all 5 regions.

4.2. The Trade Relationship between SAARC and Other Regions

Next, the trade relationship between SAARC region and other regions, namely: African region, American region, Asian region, European region, and Pacific region, respectively.

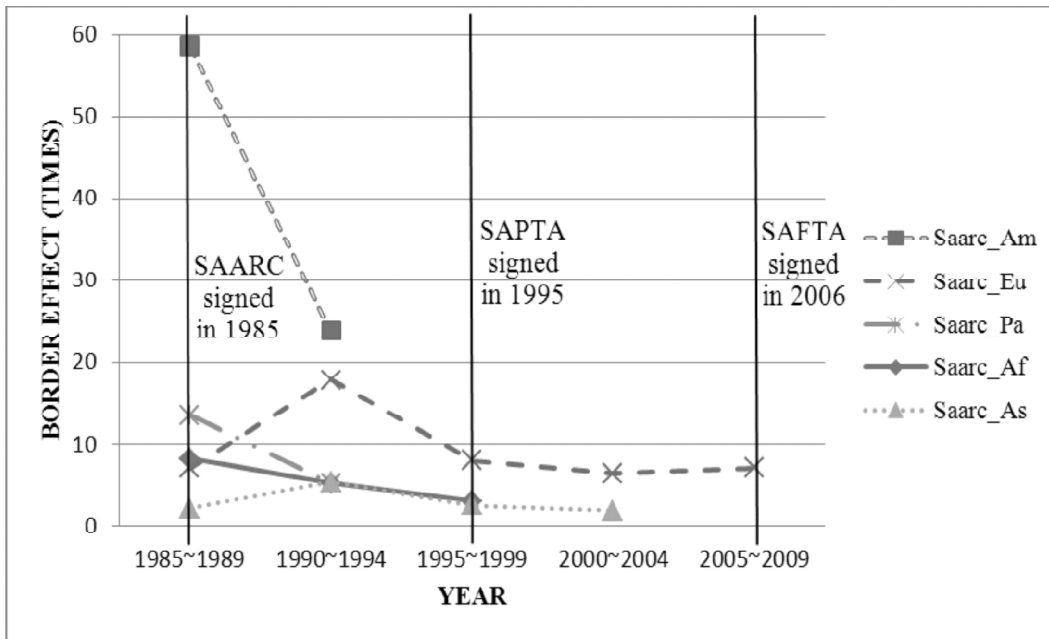


Figure 4: Model II's region-wise border effect of SAARC: Five-year interval

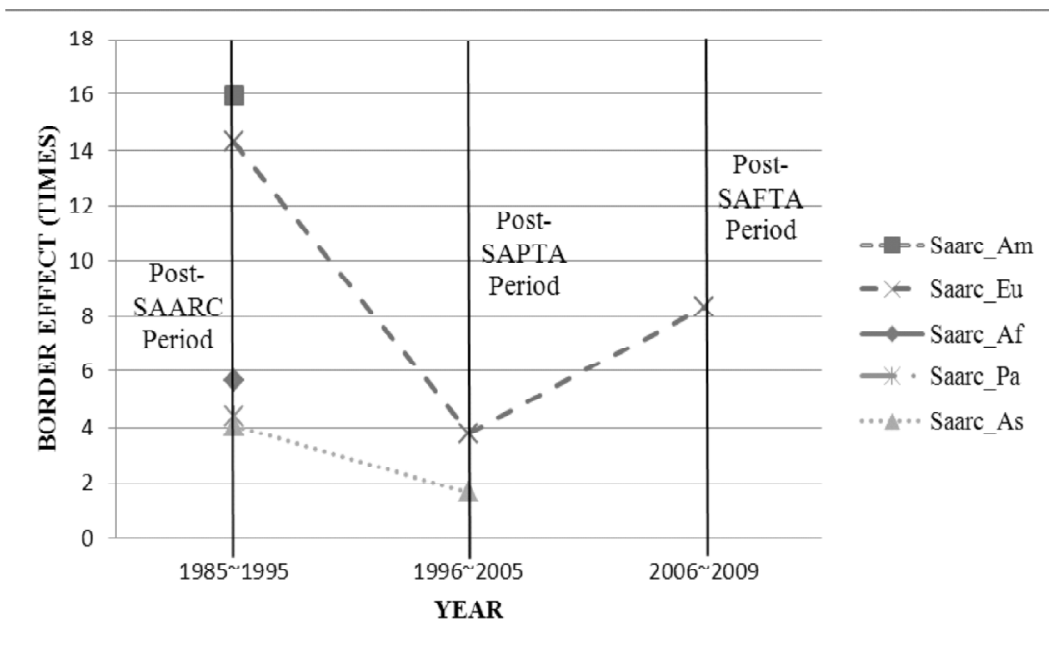


Figure 5: Model II's region-wise border effect of SAARC: SAARC integration

Table 9. shows the Panel Random-Effects regression of Model III for five-year interval. The coefficients of trade relationship between SAARC region and the other selected regions' countries are also one of the main areas of interest. The results are as follows:

The trade relationship between SAARC region and 4 African countries: The coefficient of S_Africa_{ij} are all positive, significant (except in 1995~1999) and have decreased from 1.32 in 1985~1989 to 0.78 in 1990~1994 and increased to 1.01 in 2005~2009¹⁵.

The trade relationship between SAARC region and 5 American countries: The coefficient of $S_America_{ij}$ are all positive, significant (except in 1990~1994 and 2005~2009) and have decreased from 1.20 in 1985~1989 to 0.49 in 1995~1999 and has increased to 0.68 in 2000~2004¹⁶.

The trade relationship between SAARC region and 9 Asian countries: The coefficient of S_Asia_{ij} are all positive, significant at 1% level and have decreased from 1.61 in 1985~1989 to 0.97 in 2005~2009, except for the period 2000~2004 which have increased¹⁷.

The trade relationship between SAARC region and 8 European countries: The coefficient of S_Europe_{ij} are all positive, significant at 1% level (except in 2005~2009) and have decreased from 1.65 in 1985~1989 to 0.91 in 1990~1994 and then increased to 1.31 in 2000~2004¹⁸.

The trade relationship between SAARC region and 2 Pacific countries: The coefficient of $S_Pacific_{ij}$ are all positive, significant at 1% level (except in 2005~2009) and have decreased from 2.29 in 1985~1989 to 1.402 in 1995~1999 and then increased to 1.81 in 2000~2004. But Wald test indicate conflicting results in comparison of the coefficients between the two periods, 1985~1989 and 1990~1994; and 1990~1994 and 1995~1999¹⁹. As the coefficient between the two tends to decrease but Wald test indicate that it is actually increasing.

From fig. 6., the SAARC countries trade relationship is most active with Pacific region countries followed by European region, Asian region, African region and lastly American region. It was expected that SAARC countries bilateral trade would be most active with Asian region because of close distance but surprisingly, Pacific region and European region are more active than Asian region. Overall there is a decreasing trend of trade relationship of SAARC region trade with all regions but mostly from 1995~1999 onwards, there is an increasing trend²⁰. In other words, SAARC region trades are becoming less active with all the 5 regions from 1985~1989 onwards, but after around 1995~1999 trade are becoming more and more active among each other. This could be the case of the accession of World Trade Organization (WTO) in 1995 and that the SAARC countries are trying to form bilateral or multilateral trade agreement with countries around the world that are the major trading partner.

Table 9
Model III's Panel Random-Effects results of the trade relationship between SAARC and other region countries: Five-year interval

Explained Variable: lnTrade _{ijt}					
Explanatory Variables	1985~1989	1990~1994	1995~1999	2000~2004	2005~2009
lnGdp _{it}	0.83*** (24.56)	0.99*** (33.87)	1.05*** (39.11)	1.08*** (42.76)	1.15*** (47.89)
lnGdp _{jt}	0.72*** (22.50)	0.82*** (30.32)	0.78*** (31.30)	0.82*** (33.61)	0.84*** (36.29)
lnDist _{ijt}	-1.45*** (-13.46)	-1.10*** (-12.58)	-1.18*** (-13.92)	-1.23*** (-14.25)	-1.16*** (-13.18)
Contig _{ijt}	-0.80* (-1.76)	0.13 (0.32)	0.48 (1.24)	0.37 (0.89)	0.98** (2.47)
Lang _{ijt}	0.38** (2.11)	0.69*** (4.23)	0.84*** (5.31)	0.86*** (5.83)	1.07*** (6.63)
S_Africa _{ijt}	1.32*** [4] (2.67)	0.78* [4] (1.77)	0.49 (1.10)	0.78** [4] (2.41)	1.01*** [1] (3.02)
S_America _{ijt}	1.20*** [5] (3.50)	0.48 (1.62)	0.49* [4] (1.71)	0.68** [5] (2.27)	0.08 (0.26)
S_Asia _{ijt}	1.61*** [3] (6.37)	1.08*** [2] (4.93)	0.90*** [3] (4.36)	1.21*** [3] (5.49)	0.97*** [2] (4.35)
S_Europe _{ijt}	1.65*** [2] (5.47)	0.91*** [3] (3.68)	0.97*** [2] (4.42)	1.31*** [2] (5.58)	0.37 (1.59)
S_Pacific _{ijt}	2.29*** [1] (4.70)	1.72*** [1] (3.97)	1.40*** [1] (3.45)	1.81*** [1] (4.07)	0.34 (0.76)
_cons	-10.88*** (-6.83)	-20.05*** (-14.82)	-19.81*** (-15.42)	-21.10*** (-16.41)	-24.51*** (-19.39)
R ²	0.57	0.60	0.62	0.62	0.64
Observations	4659	5306	5506	6981	7760

***, ** and * significant at the 1%, 5% level and 10% levels, respectively.

z-values in brackets; Ranking in [].

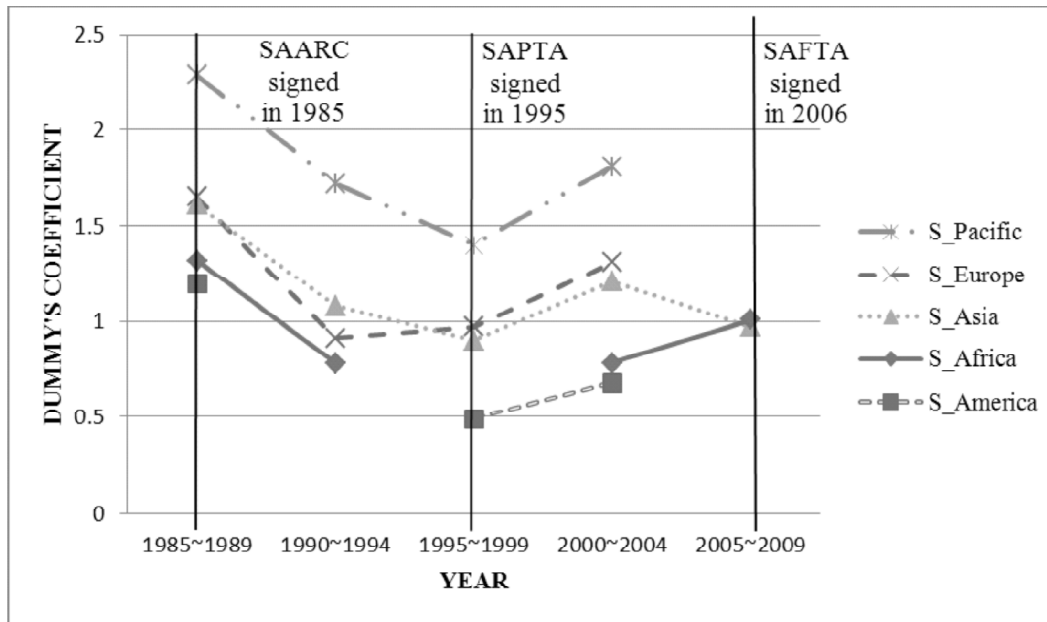


Figure 6: Border Effects of Model III's Panel Random-Effects results of the trade relationship between SAARC and other region countries: Five-year interval

Table 10 shows the Panel Random-effects of Model III as according to SAARC integration. The results of main variables of interest are as follows:

The trade relationship between SAARC region and 4 African countries: The coefficient of S_Africa_{it} are all positive, significant and have increased from 0.83 in 1985~1995 to 1.00 in 2006~2009²¹.

The trade relationship between SAARC region and 5 American countries: The coefficient of $S_America_{it}$ are all positive and significant (except in 2006~2009) and have decreased from 0.58 in 1985~1995 to 0.55 in 1996~2005²².

The trade relationship between SAARC region and 9 Asian countries: The coefficient of S_Asia_{it} are all positive, significant at 1% level and have decreased from 1.24 in 1985~1995 to 0.81 in 2006~2009²³.

The trade relationship between SAARC region and 8 European countries: The coefficient of S_Europe_{it} are all positive and significant (except in 2006~2009) and have decreased from 1.10 in 1985~1995 to 0.89 in 1996~2005²⁴.

The trade relationship between SAARC region and 2 Pacific countries: The coefficient of $S_Pacific_{it}$ are all positive and significant (except in 2006~2009) and have decreased from 1.82 in 1985~1995 to 1.32 in 1996~2005²⁵.

Taking into account the whole years from 1985~2009, as show in last column of Table 19., the coefficients of the GDPs and language dummy are significantly

Table 10
Model III's Panel Random-Effects results of the trade relationship between SAARC and other region countries: SAARC integration

Explained Variable: lnTrade _{ijt}				
Explanatory Variables	1985~1995	1996~2005	2006~2009	1985~2009
lnGdp _{it}	0.94*** (39.44)	1.09*** (50.49)	1.19*** (47.17)	0.96*** (66.44)
lnGdp _{jt}	0.80*** (36.36)	0.82*** (39.62)	0.89*** (36.30)	0.74*** (51.76)
lnDist _{ijt}	-1.16*** (-13.62)	-1.25*** (-15.24)	-1.13*** (-12.56)	-1.19*** (-15.16)
Contig _{ijt}	0.10 (0.26)	0.30 (0.75)	1.00** (2.51)	0.77** (2.14)
Lang _{ijt}	0.67*** (4.18)	0.90*** (6.19)	0.99*** (6.08)	0.97*** (6.65)
S_Africa _{ijt}	0.83* (1.90) [4]	0.81** (2.55) [4]	1.00*** (2.95) [1]	0.89*** (2.93) [4]
S_America _{ijt}	0.58** (2.07) [5]	0.55* (1.95) [5]	-0.16 (-0.50)	0.62** (2.33) [5]
S_Asia _{ijt}	1.24*** (5.99) [2]	1.07*** (5.13) [2]	0.81*** (3.56) [2]	1.29*** (6.52) [1]
S_Europe _{ijt}	1.10*** (4.83) [3]	0.89*** (4.15) [3]	0.20 (0.87)	1.02*** (4.98) [3]
S_Pacific _{ijt}	1.82*** (4.41) [1]	1.32*** (3.19) [1]	0.20 (0.44)	1.09*** (2.73) [2]
_cons	-17.96*** (-15.68)	-21.28*** (-19.29)	-27.04*** (-20.35)	-17.23*** (-21.26)
R ²	0.58	0.62	0.64	0.60
Observations	10957	13105	6150	30212

***, ** and *significant at the 1%, 5% level and 10% levels, respectively.

z-values in brackets; Ranking in [].

positive at the 1% level while the coefficient of contiguity dummy is significantly positive at the 2% level. The coefficients of distance are significantly negative at the 1% level. The coefficient of the exporting country's GDP is 0.96, the coefficient of the importing country's GDP is 0.74, the coefficient of contiguity dummy is 0.77, the coefficient of language dummy is 0.97 and the coefficient of distance is -1.19. Finally, the SAARC countries has the highest dummy variable coefficient with the Asian region of 1.29, as expected since SAARC region belong to Asian region, followed by the Pacific region (1.09), the European region (1.02), the African region (0.89), and lastly the American region (0.62).

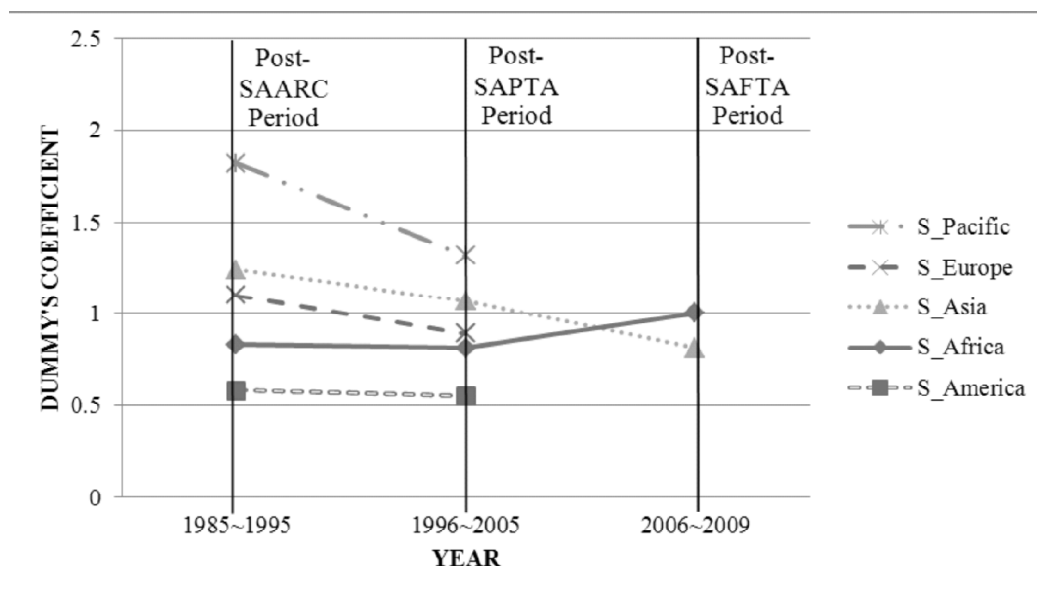


Figure 7: Border Effects of Model III's Panel Random-Effects results of the trade relationship between SAARC and other region countries: SAARC integration

5. CONCLUDING REMARKS

No matter how much the barriers to trade around the world are continually and gradually being removed or how much more further regional integration are taking place, but national border always remains a barrier to trade. So this paper uses the Gravity model to examine the border effect of SAARC that has caused its internal trade to be much more than that of its international trade.

The main results are as follows: For the basic Gravity model variable, i.e. GDP of exporting and importing country, distance, etc. results are as expected and are in consistent with the theory. For exporting and importing country's GDP, the coefficients are positive. Since large countries have huge potential demand, so the larger the economic size is, the larger would be the potential export and import

and as a result the bilateral trade flow would also be huge. While for distance coefficient, it has negative relationship with trade, as the more the distance between two countries, which indicates that the transportation cost and the trade cost will be much more, so also the trade between the two countries will decline as the distance between the two countries increases. But an empirical result shows that there is a gradual declining trend of trade cost. Finally, the two countries that share a common border and common language would naturally trade more.

The cross-sectional empirical result shows that the border effects of SAARC region against RoW are between 1.83 and 3.63 times. In other word, with border barriers affecting trade, SAARC region trade among themselves much more than around 1.83 to 3.63 times than that of its trade with countries other than SAARC member. The panel five-year interval random-effects results of the border effect of SAARC region against RoW are between 1.83 to 2.53 times, and the panel random effects according to SAARC integration year shows results of the border effect of SAARC region against RoW are between 1.89 to 2.41 times. Overall the empirical result from 1985 to 2009, record a low border effect of 1.51 times. Thus, the border effect of SAARC region is quite small as compared to Canada-U.S. border effect of 22 times as in McCallum (1995), the European countries' border effect is around 6 times in Chen (2004), and Japan's border effect of 3.41 times for the year 1990 in Okubo (2004), etc. These empirical results are in consistent with Anderson and Wincoop (2003), who argues that small countries have larger border effect. As SAARC is quite a big region and so it has small border effect. While results for region-wise border effect of SAARC region are as expected, it is smaller in respect of the Asian region, followed by the African region, the Pacific region, the European region and lastly, the American region.

On the trade relationship between SAARC region and 4 African Countries, 5 American Countries, 9 Asian Countries, 8 European Countries, and 2 Pacific Countries, respectively, whether they are active or not. The results shows the coefficients are positively significant, and thus indicate that the SAARC region trades with 5 regions are active due to globalization and economic integration taking place around the world. SAARC countries led by India are signing trade agreement with trading partners to facilitate bilateral trade through lowering barriers to trade such as tariff. It was surprising that empirical results shows SAARC region trade is more active between Europe region and Pacific region than with the Asian region countries. As normally a country would naturally trade with more with nearby countries. But overall results shows that the SAARC countries has the highest dummy variable coefficient with Asian region of 1.29, followed by Pacific region, European region, African region, and American region.

On the impact of SAPTA and SAFTA on regional internal trade, there is little impact, as there are still political conflicts between India and Pakistan; India and Bangladesh; and Nepal and Bhutan. Such conflict weakens the internal trade and

also because of SAARC member has low trade shares among themselves, especially for India, whose trade shares with SAARC member are below 1.6%.

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Notes

1. See Timbergen (1962), and McCallum (1995).
2. See Appendix A.
3. These countries are chosen to represent the 5 main regions, since they are the most common countries that trade with the SAARC countries and are the top largest trading partner.
4. Zero bilateral trade are removed from the sample and the Breusch and Pagan Lagrangian multiplier test indicates that random effect regression is much better over pool OLS regression in explaining the panel data.
5. Wald test have been carried out to compare the significant coefficient of SAARC border dummy variable with that of the consecutive year's significant coefficient, i.e. the result of Wald test between SAARC border dummy variable coefficient for the year 1992 and 1993, shows the F-value equals 0.57, the hypothesis of SAARC border dummy variable coefficient for the year 1992 less than equal to that of 1993 is not rejected, thus indicating increasing trend.
6. Since the coefficient of SAARC border dummy is the elasticity of SAARC region trade, and in order to return to the original trade flows, exponent is applied to the coefficient.
7. Only significant coefficients are used to calculate the border effect, since insignificant coefficients have no power in explaining the variable.
8. Wald test have been carried out to compare the significant coefficient of SAARC border dummy variable with that of the consecutive year's significant coefficient. The F-value of Wald test between 1990~1994 and 1995~1999, 1995~1999 and 2000~2004, 2000~2004 and 2005~2009 are 0.17, 5.80, 0.48, respectively. For the first and the last Wald test, the hypotheses are not rejected but rejected for the second Wald test.
9. Wald test have been carried out to compare the significant coefficient of SAARC border dummy variable with that of the consecutive year's significant coefficient. The F-value of Wald test between 1985~1995 and 1996~2005, and 1996~2005 and 2006~2009 are 0.00, 1.58, respectively. The hypotheses are both not rejected, indicating increasing trend. There is a conflicting result while testing coefficient of SAARC border dummy variable between 1985~1995 and 1996~2005.
10. Wald test shows contradictory results, which indicate that, the coefficient of Saarc_Af for the periods 1985~1989 to 1995~1999 are increasing instead.
11. Wald test shows contradictory results, which indicate that, the coefficient of Saarc_Am for the periods 1985~1989 to 1990~1994 are increasing instead.
12. Consistent results of Wald test on Saarc_As's coefficient.
13. Consistent results of Wald test on Saarc_Eu's coefficient.

14. Wald test shows contradictory results, which indicate that, the coefficient of Saarc_Pa for the periods 1985~1989 to 1990~1994 are increasing instead.
15. The Chi2 value of Wald test between 1985~1989 and 1990~1994, 1990~1994 and 2000~2004, 2000~2004 and 2005~2009 are 4.58, 1.63, and 2.46, respectively. For the first Wald test, the hypotheses are not rejected but rejected for the second and third Wald test.
16. The Chi2 value of Wald test between 1985~1989 and 1995~1999, 1995~1999 and 2000~2004 are 4.81, 0.50, respectively. For the second Wald test, the hypotheses are not rejected but rejected for the first Wald test.
17. The Chi2 value of Wald test between 1985~1989 and 1990~1994, 1990~1994 and 1995~1999, 1995~1999 and 2000~2004, 2000~2004 and 2005~2009 are 6.51, 7.16, 0.44, and 5.59, respectively. For the third Wald test, the hypotheses are not rejected but rejected for the rest of the Wald test.
18. The Chi2 value of Wald test between 1985~1989 and 1990~1994, 1990~1994 and 1995~1999, and 1995~1999 and 2000~2004 are 8.17, 1.29, and 1.21, respectively. For the second and the third Wald test, the hypotheses are not rejected but rejected for the first Wald test.
19. The Chi2 value of Wald test between 1985~1989 and 1990~1994, 1990~1994 and 1995~1999, and 1995~1999 and 2000~2004 are 1.40, 1.71, and 1.33, respectively. The hypotheses are not rejected for the entire Wald test.
20. Except for SAARC trade relationship with Pacific, which is actually increasing according to Wald test.
21. The Chi2 value of Wald test between 1985~1995 and 1996~2005, and 1996~2005 and 2006~2009 are 4.46 and 3.38, respectively. The hypotheses are not rejected for the second Wald test, but rejected for the first Wald test, indicating an increasing then declining trend.
22. The Chi2 value of Wald test between 1985~1995 and 1996~2005 is 5.59 and the hypothesis is rejected, indicating an increasing trend.
23. The Chi2 value of Wald test between 1985~1995 and 1996~2005, and 1996~2005 and 2006~2009 are 22.86 and 7.83, respectively. The hypotheses are not rejected for the first Wald test, but rejected for the latter Wald test, indicating a declining then increasing trend.
24. The Chi2 value of Wald test between 1985~1995 and 1996~2005 is 23.65 and the hypothesis is not rejected, indicating a declining trend.
25. The Chi2 value of Wald test between 1985~1995 and 1996~2005 is 14.14 and the hypothesis is not rejected, indicating a declining trend.

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Appendix A: Countries in the sample

Africa (53)	America (44)	Asia+SAARC (40+8)	Europe (40)	Pacific (17)
Algeria	Anguilla	Afghanistan ^a	Albania	Australia
Angola	Antigua & Barbuda	Armenia	Andorra	Cook Isds
Benin	Argentina	Azerbaijan	Austria	Fiji
Botswana	Aruba	Bahrain	Belarus	French Polynesia
Burkina Faso	Bahamas	Bangladesh ^a	Belgium	FS Micronesia
Burundi	Barbados	Bhutan ^a	Bosnia Herzegovina	Kiribati
Cameroon	Belize	Brunei Darussalam	Bulgaria	Marshall Isds
Cape Verde	Bermuda	Cambodia	Croatia	Nauru
Central African Rep.	Bolivia	China	Cyprus	New Caledonia
Chad	Br. Virgin Isds	China, Hong Kong SAR	Czech Rep.	New Zealand
Comoros	Brazil	China, Macao SAR	Denmark	Palau
Congo	Canada	Georgia	Estonia	Papua New Guinea
Côte d'Ivoire	Cayman Isds	India ^a	Finland	Samoa
Dem. Rep. of the Congo	Chile	Indonesia	France	Solomon Isds
Djibouti	Colombia	Iran	Germany	Tonga
Egypt	Costa Rica	Iraq	Greece	Tuvalu
Equatorial Guinea	Cuba	Israel	Hungary	Vanuatu
Eritrea	Dominica	Japan	Iceland	
Ethiopia	Dominican Rep.	Jordan	Ireland	
Gabon	Ecuador	Kazakhstan	Italy	
Gambia	El Salvador	Kuwait	Latvia	
Ghana	Greenland	Kyrgyzstan	Lithuania	
Guinea	Grenada	Lao People's Dem. Rep.	Luxembourg	
Guinea-Bissau	Guatemala	Lebanon	Malta	
Kenya	Guyana	Malaysia	Netherlands	
Lesotho	Haiti	Maldives ^a	Norway	
Liberia	Honduras	Mongolia	Poland	
Libya	Jamaica	Myanmar	Portugal	
Madagascar	Mexico	Nepal [†]	Rep. of Moldova	
Malawi	Montserrat	North Korea	Romania	
Mali	Neth. Antilles	Oman	San Marino	
Mauritania	Nicaragua	Pakistan ^a	Slovakia	
Mauritius	Panama	Philippines	Slovenia	
Morocco	Paraguay	Qatar	Spain	
Mozambique	Peru	Russian Federation	Sweden	
Namibia	St. Kitts and Nevis	Saudi Arabia	Switzerland	
Niger	St. Lucia	Singapore	TFYR of Macedonia	
Nigeria	St. Vincent & Grenadines	South Korea	Turkey	
Rwanda	Suriname	Sri Lanka ^a	Ukraine	
Sao Tome & Principe	Trinidad and Tobago	Syria	United Kingdom	
Senegal	Turks and Caicos Isds	Tajikistan		
Seychelles	Uruguay	Thailand		
Sierra Leone	USA	Timor-Leste		
Somalia	Venezuela	Turkmenistan		
South Africa		United Arab Emirates		
Sudan		Uzbekistan		
Swaziland		Viet Nam		
Togo		Yemen		
Tunisia				
Uganda				
United Rep. of Tanzania				
Zambia				
Zimbabwe				

^aSAARC member (South Asian Association for Regional Cooperation)
Number of countries in brackets; (Total + SAARC = 194 + 8 = 202)
Source: This study