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# Multilateralism, Regionalism and Income Convergence: ASEAN and SAARC

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## 1. Introduction<sup>1</sup>

The complementary nature of regional trade agreements (discriminatory RTAs) and multilateralism (non-discriminatory) is widely discussed in the literature (Jayanthakumaran and Sanidas, 2007; Ornelas, 2005; Koopmann, 2003; Either, 1998). The argument is based on the fact that RTAs and multilateralism are interdependent and that both encourage trade creation (both world and intra-regional) and growth. The next step in this process is to test the hypothesis that multilateralism and RTAs are complementary and that regional income convergence is likely to occur with like-minded and committed RTAs that often have links geographically and culturally. Trade and investment reforms (regardless of RTAs or multilateralism) tend to induce the resources within a region to be reallocated in response to the removal of quotas and tariffs from sectors traditionally protected, and allow income to flow from a rich to a poor nation. The catch up due to involvement in newly emerging manufacturing sectors occurs in the light of the comparative advantage (at the expense of agriculture), and converging capital-labour ratio across countries in the region (Slaughter, 1997). Our expectation is that regional members are more likely to integrate due to their ethnic and cultural links, and lower transport and transaction costs. The existing literature on the trade-growth nexus (Lewer and Van den Berg, 2003) and trade-income convergence/divergence nexus (Ben-David, 1996) reveals a strong foundation for forming this hypothesis.

In view of this, the hypothesis that 'openness' can lead to income convergence between rich and poor economies and relatively better economic growth by poor countries is widely tested (Dawson and Sen, 2007; Ghose 2004; Slaughter, 1997). The founder members of the Association of South East Asian (ASEAN-5) and the South Asian Association of Regional Cooperation (SAARC-5) had dissimilar levels of integration in terms of the RTAs (discriminatory) and multi-lateralism (non-discriminatory) and were therefore suitable for a comparative study. We used intra-ASEAN-5's (of the 5 founding counties) historical data to isolate the historically different policy interventions: the introduction of Preferential Trade Agreement (PTA) in 1977 (regionalism), uni-lateral liberalisation following a severe

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recession in the mid-1980s (non-discriminatory multilateralism), the ASEAN Free Trade Area (AFTA) formation (regionalism) in 1992, and the ASEAN and other bi-lateral RTAs in 2000s. We also used intra-SAARC-5's (of the 5 founding counties) historical data to isolate the historical policy interventions: the formation of the South Asian Association of Regional Cooperation (SAARC) in 1985, the introduction of the South Asian Association for Regional Cooperation Preferential Trading Agreement (SAPTA) in 1995, the formation of the South Asian Free Trade Area (SAFTA) in 2006, more bi-lateral agreements inside and outside member countries since the late 1990s, and a uni-lateral liberalisation by a majority of member countries in the 1990s (non-discriminatory multi-lateralism).

Numerical studies have shown that empirical tests of the convergence hypothesis using 'stochastic' convergence, which implies that shocks to the income of a given country relative to the average income across a set of countries will be temporary and ' $\beta$ -convergence,' shows that initially, a poorer economy grows faster than a richer one (Dawson and Sen, 2007; Baddeley, 2006; Carlino and Mills, 1993). The Unit-Root test revealed that the estimate of the dummies for breaks in the intercept and trend for countries in which a trend break is found, tend to be statistically significant. Various factors including financial backwardness, human capital and education and technological characteristics were considered as determining factors for the existence of poverty traps (Baddeley, 2006). This means that a trend test for the pre-and post-break periods can be applied, although shortcomings do arise if countries concerned limit the analysis to differences in GNI per capita without adequately revealing their links to international trade.

The association and causal relationship between trade per person (proxy for government intervention on trade and foreign investment), income per capita (proxy for efficiency) and Theil's (1979) value (proxy for regional income convergence/divergence) in founder members of ASEAN and SAARC nations is examined in order to present an analysis of trade policy interventions in regional income convergence. This was undertaken in the light of the comparative advantage of allowing income to flow from a rich to a poor nation within the region through trickle down effects. The expectation of this method is to directly link international trade and income convergence of the region as a whole. The Lumsdaine and Papell approach is used to detect two structural breaks over time (reflecting policy reforms as indicated by Perron, 1997) in the unit root analysis. We adopted a residual based co-integration test in the possible presence of an endogenously determined structural break. The Granger causality test (1969) will be performed on a stationary basis to show the causal relationship between the variables. Section 2 reviews the theoretical and empirical analysis of trade liberalisation and income convergence. Section 3 deals with trade liberalisation and regional income convergence in ASEAN-5 and SAARC-5 countries. Section 4 deals with methodology and section 5 with the results. Section 6 presents conclusions.

## 2. Trade liberalisation and regional income convergence

Solow's factor-price equalisation theorem shows that free trade tends to equalise (or converge) factor prices and endowments across countries (Solow, 1956). In order to find evidence on Solow's theorem, recent empirical studies focus per capita income convergence (Ben-David, 1993). International trade can influence per-capita income by enforcing the factor price equalisation theorem, as mentioned above, and by encouraging the international flow of technology and by trading capital goods (Slaughter, 1997). However, the factor-price

equalisation theorem revealed outcomes in a steady state free trade equilibria but not in the process of trade liberalisation.

Empirical studies fill this gap in their analytical framework by considering proxies such as high levels of trade between countries and the removal of obstacles. Ben-David (1993, 1994, 1996) examined the effect of trade on income convergence on a regional basis (i.e. cross-country income differentials) and concluded that most sample countries among particular groups, for example, the European Economic Community (EEC) and European Free Trade Association (EFTA) exhibited significant income divergence during the pre-war (pre-trade reforms) period this tended towards convergence when trade liberalisation was introduced. Empirical tests revealed mixed results but there was strong evidence in favour of convergence (Dawson and Sen, 2007; Ghose 2004; Slaughter, 1997). On the contrary, wealthier countries grew faster than poor countries and the current era of globalisation has not been associated with convergence in economic outcomes (Baddeley, 2006; Pritchett, 1997). Chotikapanich, Valenzuela and Rao (1997), show a very high degree of global inequality but with some evidence of catch-up and convergence between regions.

The convergence hypothesis articulates three reasons why poor economies within a region (RTAs) are expected to grow faster than wealthier economies during regional integration. First, poor economies (late comers) are more likely to adopt existing technologies which pioneers have already developed, and trade raises factor prices for poor economies and thus per capita income. Second, the growth theory assumes diminishing returns to factor inputs and therefore capital productivity is higher among poor economies subjected to scarce capital. The expectation is that the capital-labour ratio converges across a region and thus per capita income. Third, workers are likely to move from low productivity agricultural activities to various high productivity manufacturing and service sectors where there are cost advantages. The critics argue that (a) as wealthier countries in the region have their accumulated experience of developing leading edge technologies, (b) poor economies tend to adopt labour intensive technology instead of capital intensive technology and, (c) wealthier countries tend to access increasing returns to factor inputs (Ghose 2004; Slaughter, 1997). The convergence hypothesis cannot be interpreted at the growth aspect only, as mentioned above, but also as distributional outcomes that are widely known as the income trickle down effect. It is expected that the higher the integration across a region, the higher will the trickle down effect be as regionally-oriented trade and investment reforms tend to allocate resources internally in response to comparative advantages, and then incomes trickle down over time to the respective booming sectors.

The inter-links and complementarity nature of regionalism (discriminatory RTAs) and multi-lateralism (non-discriminatory) gained attention in the literature (Jayanthakumaran and Sanidas, 2007<sup>2</sup>; Ornelas, 2005; Koopmann 2003; Freund 2000; Ethier, 1998). Although RTAs are discriminatory by nature, they are competent at deeper trade reforms because they are more like minded and dedicated, and are often connected culturally and geographically. Access to wider regional markets encourages deeper economic and institutional integration, and extra economic reforms enhance regional cost advantages which eventually allow a

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<sup>2</sup>Jayanthakumaran and Sanidas concluded that intra-ASEAN-5 exports and national Gross Domestic Products doubled from the first stage of regionalism to the second stage of multi-lateralism, and doubled again from the second stage of multi-lateralism to the third stage of regionalism. The stages are defined in section 3.

region to reach global efficiency. Marginal reforms (removal of protection) to regionally oriented trade and investment tend to allocate resources internally in response to the elimination of quotas and tariffs in sectors traditionally protected. On the other hand, global reform policies are likely to trigger regional economic activities and factor mobility by creating links between regional firms and industries due to lower transaction and transport costs. Regional member countries are relatively competent at exploiting these advantages mainly because of lower transportation costs, similar ethnic and cultural links, and lower transaction costs.

Recent studies that focused on RTAs to income convergence (Moon, 2006; Niebuhr and Schlitte, 2004; Lopez-Bazo, Vaya and Artis, 2004) revealed positive results. Convergence within a group of nations does not imply a reduction in international inequality but it does imply a convergence within a group motivated by population growth rates, investment rates, human capital, and policy intervention. For example, Niebuhr and Schlitte (2004) concluded that per capita incomes in the 15 European Union countries converged between 1950 and 2000 at an estimated average rate of about 1.6%. Moon (2006) concluded that East Asia as a whole tended to converge through the period 1980-2000. Lopez-Bazo, Vaya and Artis' (2004) study of the externalities of production across the European region concluded that spill overs, far from being negligible, are robust and may cause non-decreasing returns at the spatial aggregate level. Studies attempting to focus on trade to income convergence at a country level (Yao, Zhang and Feng, 2005; Silva and Leichenko, 2004) revealed mixed results. Silva and Leichenko (2004) investigated the effects of trade on income inequality across regions/states in the United States and concluded that the impact of globalisation was uneven. Yao, Zhang and Feng (2005) showed clear evidence of a divergence in per-capita rural (and urban) incomes and total expenditure.

Countries which embrace greater global and regional integration experience macroeconomic fluctuations such as business cycles, co-movement in sub-sets of countries, uncertainty in oil prices, and increasing costs of international transportation. The extent and variation of these fluctuations depend on the substitutability of domestic, regional and world goods. Costs of transportation into an international trade model can have large welfare costs and determine the substitutability of domestic, regional and world goods (Ravn and Mazzenga, 2004). A common world or regional factor such as world price shocks can be a pertinent source of volatility for aggregates in most countries, especially in open developing economies (Kose, 2002). During the oil shocks over the period from 1971 to 1989, the increased volatility in the terms of trade occurred largely from an increased volatility in the relative price of oil rather than the increased volatility of exchange rates (Backus and Crucini, 2000). The financial crisis in Thailand in 1997 eventually impacted on the majority of countries in the region. This evidences show that the extent of vulnerability varies and requires the substitutability of domestic, regional, and world goods. Greater regional integration can be an option in the situation where petrol prices and costs of international transportation are rising. The co-movement of countries in subsets may demand greater international integration.

### **3. ASEAN-5 and SAARC-5 countries**

#### **3.1 Trade liberalisation**

In 1967 Malaysia, Indonesia, Thailand, the Philippines, and Singapore formed the ASEAN-5 group to promote cooperation in economic, social, and cultural areas, and to promote



regional peace and stability.<sup>3</sup> They introduced a Preferential Trade Agreement (PTA) in 1977, uni-lateral liberalisation following the severe recession of the mid-1980s, the ASEAN Free Trade Area (AFTA) formation in 1992 and proliferation of RTAs in the 2000s such as ASEAN + China + Korea + Japan; India + Malaysia; India + Singapore, ASEAN + India and Thailand + the United States in the 2000s. The formation of the ASEAN Free Trade Area (AFTA) was a milestone followed by the signing of a Common Effective Preferential Tariff (CEPT) Agreement that limited tariffs to 0-5% by 2002/2003.<sup>4</sup> The average CEPT tariff rate in the inclusion list was reduced from 12.76% in 1993 to 2.68% in 2003 (US - ASEAN Business Council, 2004). After 1992 an agreement for intra-ASEAN investment, non-tariff barriers, services, intellectual property, and customs and tourism was also reached. The prospect of ASEAN's decision in 2003 to create an ASEAN Economic Community by 2020 was another important item on the agenda.

Seven South Asian countries – India, Pakistan, Bangladesh, Sri Lanka, Bhutan, Maldives and Nepal – agreed to commit to trade liberalisation under the umbrella of the South Asian Association for Regional Cooperation Preferential Trading Agreement (SAPTA).<sup>5</sup> The South Asian Association of Regional Cooperation (SAARC) was formed in 1985, the South Asian Association for Regional Cooperation Preferential Trading Agreement (SAPTA) began in 1995, the South Asian Free Trade Area (SAFTA) began in 2006, the uni-lateral liberalisation by a majority of member countries began in the 1990s (non-discriminatory multi-lateralism) and there have been more bi-lateral agreements between inside and outside member countries since the 2000s.<sup>6</sup> India, Pakistan, and Sri Lanka agreed to reduce customs duties for products from those wealthy member countries to 0-5 per cent by 2009, to allow differential treatment for the least developing members.

The extent of globally oriented trade and investment reforms (non-discriminatory multi-lateralism) across SAARC countries has not been consistent enough and varied over time (Panagariya, 1999). India is the largest nation, contributing about 80% of the regional GNI, and is the determining force in SAARC. The present trade and investment regime in ASEAN-5 countries is much more liberal towards globally-oriented multilateralism (Table 1). Following a severe recession in the mid-1980s and the steady fall in the price of oil, the

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<sup>3</sup> Brunei joined ASEAN in January 1984. Burma, Cambodia, Laos, and Vietnam joined in the 1990s. Our research focuses on the founder members of ASEAN (ASEAN-5) mainly because of continuous availability of data.

<sup>4</sup> The AFTA Council was made responsible for supervising, coordinating and reviewing the implementation of the CEPT agreement that covered manufacturing and processed and unprocessed agricultural commodities.

<sup>5</sup> In December 1985 (Dhaka), a Charter that established the South Asian Association of Regional Cooperation (SAARC) was adopted. In December 1991 (Colombo), an institutional framework under which specific measures for trade liberalisation between SAARC member countries could be advanced, was agreed upon. The idea of forming SAPTA originated in 1991 and became operational in December 1995 (Paswan 2003, pp.346-49).

<sup>6</sup> India, and Singapore Comprehensive Economic Cooperation Agreement (CECA) in 2003, India and Thailand in 2004, India and Malaysia agreed to establish a Comprehensive Economic Partnership (CEP) in 2004, India and China in 2004, India and Mercosur, constituting Argentina, Brazil, Paraguay, Uruguay in 2004, Bolivia and Chile in 2004, ASEAN-India Regional Trade and Investment Area (RTIA) in 2003.

ASEAN-5 countries initiated important policy reforms (de-regulation, trade, finance, tax and foreign direct investment) at their own pace (Tan, 2004). The extent varied between countries and over time but trade liberalisation as the bottom-line of all reform exercises, remained the same. Pre 1990s, import weighted means tariffs were much lower in the ASEAN-5 countries and have been reduced extensively since then. On the contrary though, pre-1990's tariffs in the SAARC countries were very high although some attempts were made to reduce tariffs during this period. The current tariff rates in Sri Lanka are comparable to ASEAN countries.

The economic performance of ASEAN-5 is remarkable, with the region's per-capita income in 2007 ranging from US\$1620 in the Philippines to \$32470 in Singapore (World Bank, 2008). The ASEAN countries had homogeneous historical and cultural values and increasingly adopted the policy experiences of their neighbours. The regional measures (discriminatory) taken by the ASEAN-5 countries reduced inefficiencies and transaction costs in the system and accelerated economic growth which in turn resulted in 'innovative and bold regional experiments' (Ariff, 1994). The ASEAN-5 countries were now integrated more than ever, partly due to regional economic cooperation initiated by them, and partly due to anonymous market forces initiated by global policies. There is evidence to show that the uni-lateral liberalisation taken in the late 1980s by the ASEAN-5 countries outside the ASEAN framework united the ASEAN members in economic cooperation and contributed to increased intra-ASEAN trade flows (Kettunen, 1998; Ariff, 1994; Imada, 1993).

SAARC countries are also comparable as they have similar historical and cultural links with increasingly dissimilar policy experiences. The economic performance of SAARC-5 countries is not impressive, with the region's per capita income in 2007 ranging from US\$340 in Nepal to US\$1540 in Sri Lanka (World Bank, 2008). This region accounts for approximately 20 per cent of total world population and generates less than 2 per cent of total world GNP. It disintegrated due to political differences, ethnic tensions, human rights abuses, and corruption (Wagle, 2007). Bandara and Yu (2003) used the GTAP model to argue that SAFTA would not benefit the region economically because they cannot meet at summits due to political conflicts.

Country	Year	Simple mean tariff (percent)	Standard deviation	Import-weighted mean tariff (percent)	Percentage share of tariff lines with tariffs above 15 percent
SAARC					
India	1990	79.0	43.6	49.6	97.0
	1999	32.5	12.3	28.5	93.1
	2001	32.3	13.0	26.5	
Sri Lanka	1990	28.3	24.5	26.9	51.7
	2000	9.9	9.3	7.4	22.0
	2001	9.2	9.3	6.6	
Pakistan	1995	50.9	21.5	46.4	91.4
	1998	46.6	21.2	41.7	86.3
	2003	17.1	10.9	14.4	
Bangladesh	1989	106.6	79.3	88.4	98.2
	2000	21.3	13.6	21.0	51.8
	2004	18.4	10.2	16.8	

Nepal	1993	21.9	17.8	15.9	58.9
	2000	17.9	20.9	17.7	18.7
	2003	13.6	10.9	16.8	
ASEAN					
Indonesia	1989	21.9	19.7	13.0	50.3
	2000	8.4	10.8	5.2	11.2
Malaysia	1988	17.0	15.1	9.4	46.7
	1997	9.3	33.3	6.0	24.7
The Philippines	1989	28.0	14.2	22.4	77.2
	2000	7.6	7.7	3.8	8.8
Thailand	1989	38.5	19.6	33.0	72.8

Table 1. Comparison of External Tariff Barriers: SAARC-5 and ASEAN-5 Countries  
Source: Srinivasan and Tendulkar (2003), and Das (2008)

### 3.2 GNI per capita, trade per person and income convergence

The Theil value of inequality reveals an indicator of the relative distribution of income across the nations. It does this by measuring the proportion of each nation's share of income to its share of population in the region and then adds these figures to the region (Silva and Leichenko, 2004; Nissan and Carter, 1993). The Theil value enables one to decompose overall changes in the region into changes within the concerned groups of countries that are suitable for regional analysis. One should note that the Theil value lack a straightforward representation and appealing interpretation like the Gini coefficient.

Let the country  $i$  populating share of the region be  $p_i$ ,  $\sum_i p_i = 1$ ; the country  $i$  income share of the region by  $y_i$ ,  $\sum_i y_i = 1$ ; the region  $R_g$  population share of the nation be  $p_g = \sum_i p_i$ ,  $i \in R_g$ ; and the region  $R_g$  income share of the region be  $y_g = \sum_i y_i$ ,  $i \in R_g$ . The measure can be written as;

$$J_r = (1/n_g) \sum_{i \in R_g} \left( \frac{p_i}{p_g} \right) \div \left( \frac{y_i}{y_g} \right) \quad (1)$$

Where  $n_g$  is the number of countries in the region  $R_g$ . When  $J_r > 1$ , the country concerned has less than its proportional share of national income. In other words the share of population is larger than the share of income, which implies higher levels of inequality across countries. When  $J_r < 1$ , the country concerned receives a larger share of income than its share of population. The notation  $i \in R_g$  indicates that the country ( $i$ ) is part of the region ( $R_g$ ).

If there is a catch up process then it is expected that international trade (trade per person) and convergence (the Theil value) is possibly associated with each other. For example, there will be a positive association in the case of either (a) trade increasing and the Theil value is approaching 1 (equality) from a higher value or (b) trade is increasing and the Theil value is approaching 1 from a lower value. Trade per person is defined as the overall trade in the region (exports + imports) divide by the size of population in the region.



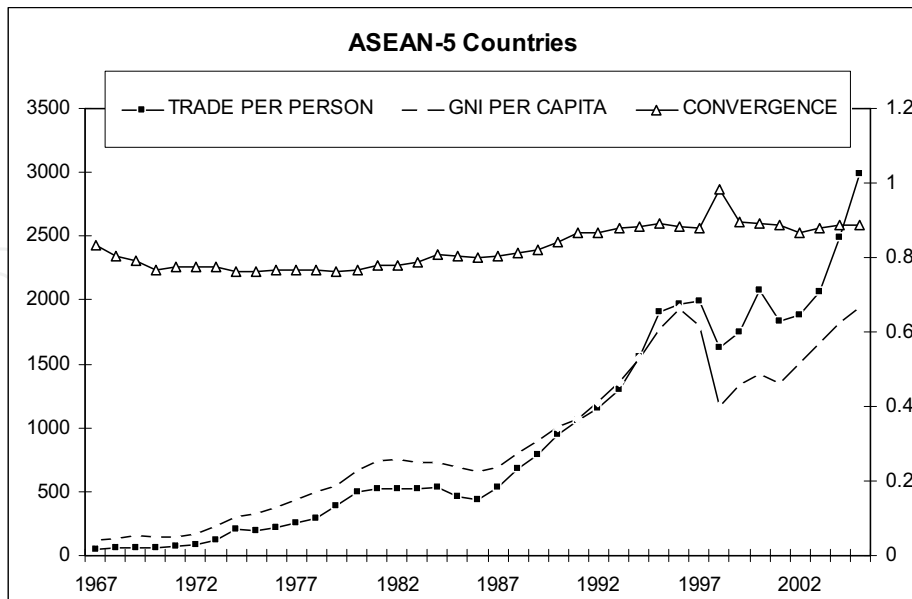


Fig. 1. (a): Trade per person, GNI per capita and Theil (convergence) values: ASEAN-5 and SAARC-5 countries

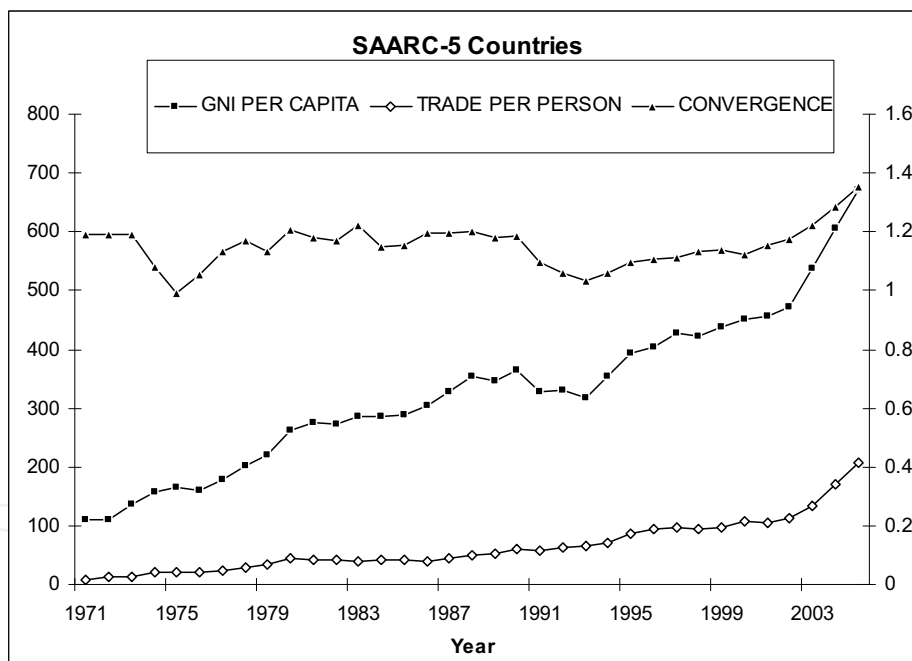


Fig. 1. (b): Trade per person, GNI per capita and Theil (convergence) values: ASEAN-5 and SAARC-5 countries

Figure 1 (a and b) shows the trade per person, GNI per capita, and Theil values for the 5 founding ASEAN countries and 5 major SAARC countries. It is evident that the major partners of ASEAN-5 experienced a relative boost in their trade per person and GNI per capita following major policy changes in (approximately) 1977, 1987, 1992, and 2002. The Asian financial crisis is also visible with a sudden drop in 1997-1998. Another notable aspect

is that in 1992 trade-per-person exceeds income-per-capita, and the gap has widened further since then. The Theil values over the study period indicated that the region received a larger share of income, on average, than its share of population and experienced regional income convergence and rising trade. The Theil values showed that convergence (equality) across the member countries increased from 0.76 in 1970 to 0.89 in 1995 and remained the same thereafter, except in 1998.

The SAARC-5 partners seem to have experienced a relative boost in their trade per person and GNI per capita after these approximate dates, 1995 and 2004. However, there is a quite a large gap between trade per person and GNI per capita. The SAARC-5 region receives less than its proportional share of national income. The Theil values show that divergence (inequality) across the member countries remained stable with the small amount of fluctuations around 1.18 from 1971 to 1990. During 1991-2001, the Theil values fluctuated between 1.09 to 1.13, reflecting the consequences of convergence. More divergence was recorded after 2002.

#### 4. Methodology

This study proposes the hypothesis that multi-lateralism and regionalism are complementary and that convergence of regional income with a like minded and committed regionalism that often has links culturally and geographically, is more than likely. In order to examine the impact of government intervention on trade and the convergence (or divergence) regional income, the historical time series data of trade per person (proxy for government intervention on trade), GNI per capita (proxy for efficiency), and Theil's values (proxy for income convergence/divergence) that covers the periods from 1967 to 2005 for ASEAN-5 countries and 1971 to 2005 for the SAARC-5 countries, are measured and analysed separately.

The unit root tests and the Augmented-Dickey-Fuller (ADF) can be applied to examine the characteristics of stationary for uni-variate time series. It should be noted however, that the conventional ADF test failed to detect structural breaks in the time series data, which may have been biased towards the non-rejection of a unit root when the trend of the series is stationary within each sub-period (Perron, 1997). Furthermore, structural breaks may occur by reflecting, for example, on a country's policy reforms or slowdown in growth (Perron, 1997). Therefore, a unit root test in the presence of two endogenously determined structural breaks will be achieved using the Lumsdaine and Papell approach. Lumsdaine and Papell (1997) argue that only one endogenous break may not be sufficient because it could lead to a loss of information if there is more than one break.

Using LP approach, the unit root analysis in the presence of structural breaks is formulated as follows:

$$\Delta y_t = \mu + \beta t + \theta DU1_t + \gamma DT1_t + \omega DU2_t + \varphi DT2_t + \alpha y_{t-1} + \sum_{i=1}^k c_i \Delta y_{t-i} + \varepsilon_t \quad (2)$$

where  $\Delta$  represents the first difference operator.  $y_t$  is the time series being tested and  $t$  is a time trend variable.  $t=1, \dots, T$ , where  $c(L)$  is a lag polynomial of known order  $k$ . This model included enough numbers of lags,  $k$ , to ensure the residual term  $\varepsilon_t$  is white noise, and the optimal lag length  $k$  is based on the general to specific approach suggested by Ng and

Perron (1995).  $DU1_t$  and  $DU2_t$  are dummy variables for a mean shift occurring at times  $TB1$  and  $TB2$  ( $1 < TB < T$ ,  $TB$  is the break date), respectively.  $DT1_t$  and  $DT2_t$  are the corresponding trend shift variables.  $DU1_t = 1$  if  $t > TB1$  and zero otherwise;  $DU2_t = 1$  if  $t > TB2$  and zero otherwise;  $DT1_t = t - TB1$  if  $t > TB1$  and  $DT2_t = t - TB2$  if  $t > TB2$  and zero otherwise.

This equation (2) allowed for two breaks in both intercept and slope term of the trend function. The break dates were determined by depending on the minimum value of the  $t$  statistics for  $\alpha$ . Using an annual time series in this study followed by an LP approach (1997), we assumed  $k_{max}$  was up to 8 for ASEAN-5 countries and 2 for SAARC-5 countries. If the  $t$ -statistic of  $\alpha$  was higher than the critical value then the unit root of null hypothesis could not be rejected.

Once the characteristics of the uni-variate time series data was identified, the Granger (1969) causality test were performed on a stationary basis and in the framework of either the VAR model or vector ECM. The Granger causality test provided information about whether changes in one variable preceded changes in another. The decision rule for causality was that if the null of non-Granger causality from  $X$  to  $Y$  was rejected at the 5 per cent level, then it can be concluded that  $X$  Granger caused  $Y$ . If both tests rejected the null hypothesis, then we could conclude that there was a lagged feedback effect which was a bi-directional causal relationship between two variables. It should be noted that this model does not infer any 'cause and effect' relationship but only predictability between these two variables. The Granger causality tests were based on the framework of either the VAR or ECM. The Granger causality model can be formulated as follows (3) ~ (6):

$$LTRADE_t = \sum_{j=1}^p \alpha_{11,j} LTRADE_{t-j} + \sum_{j=1}^p \alpha_{12,j} LGNI_{t-j} + \varepsilon_{t1} \quad (3)$$

$$LGNI_t = \sum_{j=1}^p \alpha_{21,j} LGNI_{t-j} + \sum_{j=1}^p \alpha_{22,j} LTRADE_{t-j} + \varepsilon_{t2} \quad (4)$$

$$LTRADE_t = \sum_{j=1}^p \alpha_{11,j} LTRADE_{t-j} + \sum_{j=1}^p \alpha_{12,j} LTHEEL_{t-j} + \varepsilon_{t1} \quad (5)$$

$$LTHEEL_t = \sum_{j=1}^p \alpha_{21,j} LTHEEL_{t-j} + \sum_{j=1}^p \alpha_{22,j} LTRADE_{t-j} + \varepsilon_{t2} \quad (6)$$

where  $\varepsilon_{t1}$  and  $\varepsilon_{t2}$  are white noise, and  $p$  is the lag length. A test of joint significance of these lagged terms ( $\alpha_{12,j} = 0, j = 1, \dots, p$  and  $\alpha_{22,j} = 0, j = 1, \dots, p$ ) constitutes a short-run Granger causality test. Possible situations showing whether two variables have any causal relationship are as follows:

a) One-way causality if  $\sum_{j=1}^p \alpha_{22,j} \neq 0$  and  $\sum_{j=1}^p \alpha_{21,j} = 0$ , or  $\sum_{j=1}^p \alpha_{12,j} \neq 0$  and  $\sum_{j=1}^p \alpha_{11,j} = 0$ .

b) Bi-directional causality if  $\sum_{j=1}^p \alpha_{12} \neq 0$  and  $\sum_{j=1}^p \alpha_{22,j} \neq 0$ .

c) No causal relationship if  $\sum_{j=1}^p \alpha_{12}$  and  $\sum_{j=1}^p \alpha_{22,j}$  are not statistically significant.

Our analysis covers 39 years (1967-2005) for ASEAN-5 and 34 years (1971-2005) for SAARC-5 countries.<sup>7</sup> All the variables are in ratios and expressed in natural logs. We obtained the data for trade (export plus imports), GNI, exchange rate and population from World Bank dx spreadsheets (2006). GNI is converted into US\$ by using corresponding exchange rates. GAUSS software was used to conduct the LP tests while E-views was used to conduct Granger causality.

## 5. Results

The results<sup>8</sup> in Table 2 and Figure 2 show the two most significant structural breaks which affected the variables in the respective trade blocs (ASEAN-5 and SAARC -5) using the Lumsdaine and Papell procedure. TB1 and TB2 indicate the time of the structural breaks. The endogenously determined structural breaks for the majority of variables are significant, at least at the five per cent level. The empirical results show that the t-statistics for  $\mu, \beta, \theta, \gamma, \omega$  and  $\varphi$  are significant in most cases. Given the fact that all of the estimated coefficients for the indicator and dummy trend variables are statistically significant for the majority of them, it can be argued that the estimated dates of the structural breaks are indeed significant.

The test detected break points in trade per person for ASEAN-5 countries in 1987 and 1999. These breakpoints coincide with multi-lateral trade liberalisation by individual member countries of ASEAN and recovery from the Asian crisis respectively. The break for GNI occurred in 1989 (not significant at the 10% level) and 1998, the latter coincided with a recovery from the Asian crisis. The break points for the THEIL value (proxy for convergence/divergence) occurred in 1981 and 1989, which coincided with the oil crisis and multi-lateral trade liberalisation respectively. Both events pushed the region to converge such that it now closely approaches the point where the share of income to the share of population is equal. We observed that the dispersion gap in income widened in the Philippines and Indonesia and narrowed down in Thailand. Malaysia and Singapore remained the same (Jayanthakumaran and Verma, 2008).

The results in 'Table 2' and 'Figure 3' from using the Lumsdaine and Papell procedure show the two most significant structural breaks which affected the variables in the SAARC-5 region. The test detected break points in trade per person in 1992 and 2002. These breakpoints coincide with India's (largest nation in the region contributing 80% of the overall GNI) attempt at multi-lateral trade liberalisation and more bi-lateral dealings among

<sup>7</sup> Data for Bangladesh is available (after the separation from Pakistan) only from 1971 and therefore our analysis covers the 34 years from 1971 (1971-2005).

<sup>8</sup> ASEAN results are from Jayanthakumaran and Verma (2008).

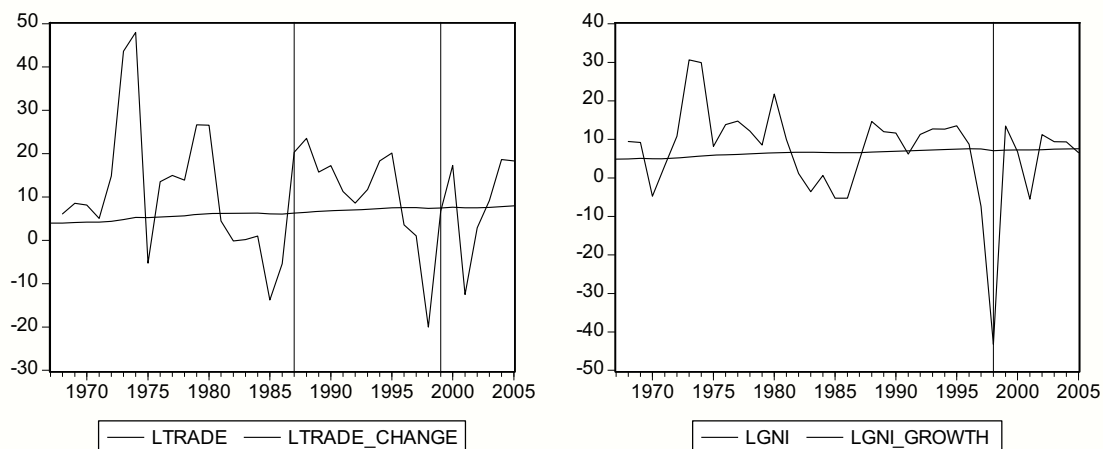
individual SAARC member countries (for example, progress on India Sri Lanka CEPA) respectively. The break of GNI occurred in 1990 which indicates that a deterioration in the growth rates in the region coincided with a global recession, while an indication of positive growth in 2002 coincided with more bi-lateral trade agreements by individual countries. The break points for the THEIL values (proxy for convergence/divergence) occurred in 1985 and 2000, which coincided with the oil crisis in 1985/86 and the enforcement of bi-lateral RTAs respectively. Both events pushed the region to diverge and moved it away from the point where the share of income to the share of population widened. From 1990-1994 one can notice that the region converged such that the index closely approaches the point where the share of income to the share of population is equal.

	TB1 TB2	$k$	$\mu$	$\beta$	$\theta$	$\gamma$	$\omega$	$\varphi$	$\alpha$
ASEAN-5 LGNI	1989+ 1998	8	6.161 (5.23)	-0.565 (-4.52)	-1.528 (-2.08)	0.263 (1.52)	-2.590 (-3.17)	0.625 (1.52)	-1.731 (-5.73)
SAARC-5 LGNI	1990 2002	2	118.61 (6.57)	12.528 (5.77)	-51.66 (-4.67)	-0.066 (-0.04)	-31.387 (-1.78)	35.468 (4.96)	-0.916 (-6.05)
ASEAN-5 LTHEIL	1981 1989	5	3.082 (4.24)	-1.050 (-5.35)	-3.107 (-3.52)	1.600 (4.63)	2.832 (3.10)	-1.265 (5.06)	-1.653 (-7.44)*
SAARC-5 LTHEIL	1985 2000	7	5.990 (2.68)	0.015 (2.32)	0.119 (3.72)	-0.0340 (-3.88)	-0.015 (-0.52)	0.0795 (5.99)	-2.417 (-6.01)
ASEAN-5 LTRADE	1987 1999	6	2.884 (5.37)	0.193 (4.742)	2.804 (4.18)	-0.963 (-6.32)	1.328 (1.82)	-0.299 (-1.92)	-2.760 (-6.76)
SAARC-5 LTRADE	1992 2002	8	85.073 (7.12)	7.134 (6.27)	-8.081 (-2.19)	6.402 (9.20)	-17.596 (-2.27)	32.467 (6.69)	-3.475 (-6.70)

Table 2. Estimating the Time of Structural Breaks by Lumsdaine and Papell (LP) Approach

$$\Delta y_t = \mu + \beta t + \theta DU_{1t} + \gamma DT_{1t} + \omega DU_{2t} + \varphi DT_{2t} + \alpha y_{t-1} + \sum_{i=1}^k c_i \Delta y_{t-i} + \varepsilon_t \quad (2).$$

Note: \* Critical value at 5% level of significance for coefficient  $\alpha$  is -6.82.  $t$ -statistics are in parentheses. See equation 1 for details of notations. + The break is not significant.





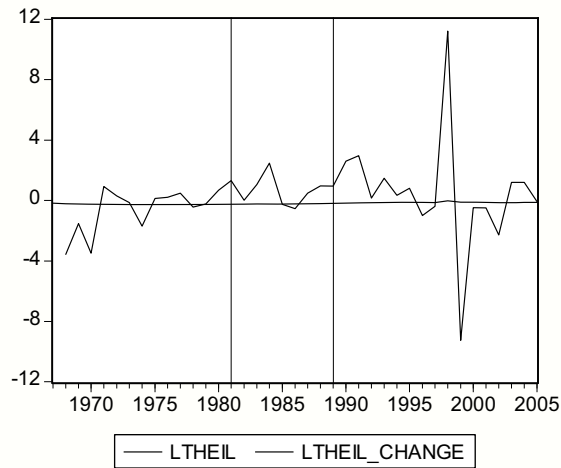


Fig. 2. Plots of the ASEAN-5 Series and Endogenously Estimated Timing of Structural Breaks by the Lumsdaine and Papell Test

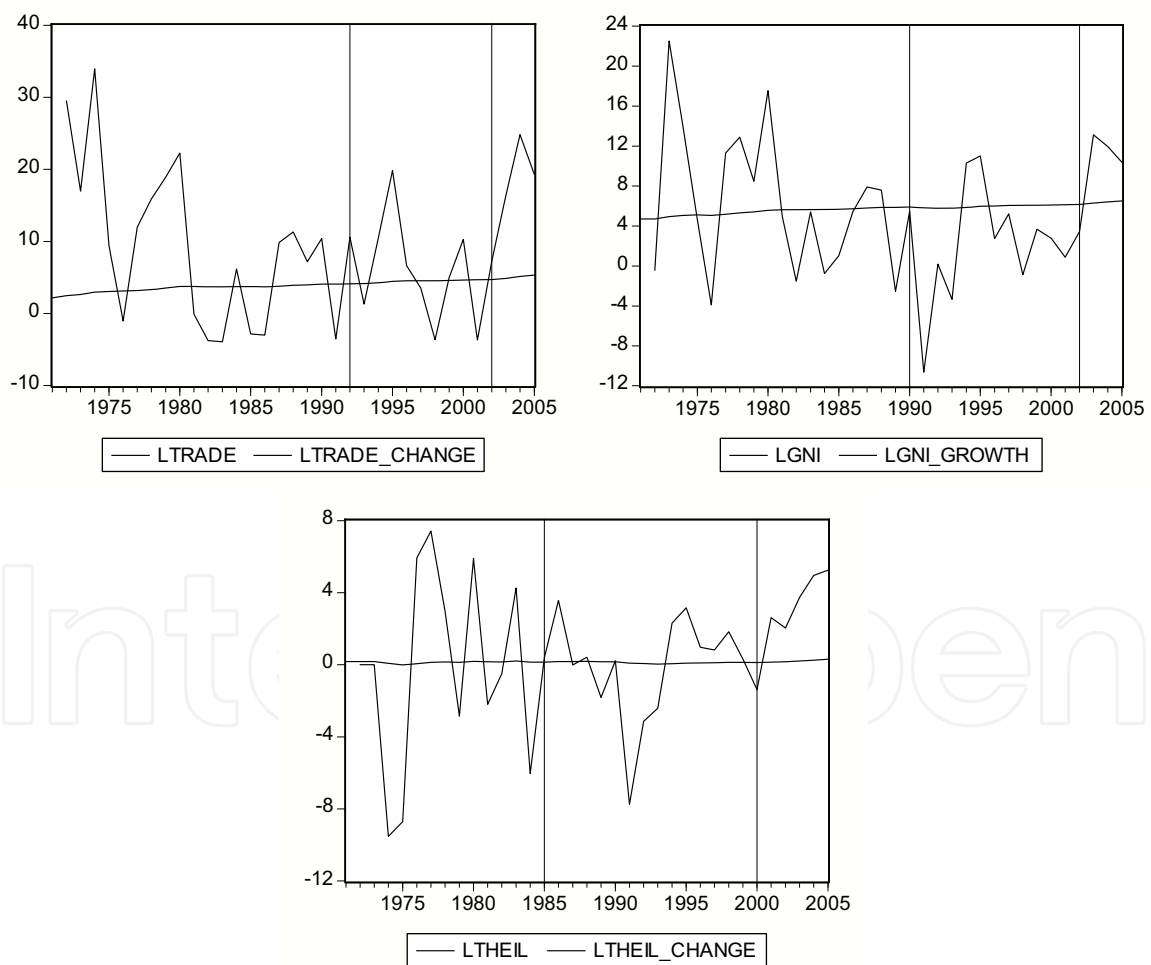


Fig. 3. Plots of the SAARC-5 Series and Endogenously Estimated Timing of Structural Breaks by the LP Test

The Granger causality test of ASEAN-5 countries (Table 3) showed the null hypothesis that trade does not ‘Granger cause’ the Theil value, and can therefore be rejected at the 5 per cent level ( $p$ -value: 0.0021), whereas the null hypothesis that the Theil values does not ‘Granger cause’ trade can be rejected at the 1 per cent level ( $p$ -value 0.0000). Based on these results for the ASEAN-5 countries, we conclude that there is a two-way causal relationship between the flow from trade to convergence and from convergence to trade. The unit root null hypothesis cannot be rejected for GNI and TRADE at the five per cent level because the  $t$ -statistic is below the critical value of -6.82. However the THEIL value (proxy for convergence/divergence) was found to be stationary in the presence of two structural breaks at the significant five per cent level.

Ho	p	Chi-sq	d.f	prob
ASEAN-5 LTRADE does not Granger cause LGNI	4	7.9510	4	0.0934
SAARC-5 LTRADE does not Granger cause LGNI	1	2.6921	1	0.1008
ASEAN-5 LGNI does not Granger cause LTRADE	4	28.5458	4	0.0000***
SAARC-5 LGNI does not Granger cause LTRADE	1	2.0502	1	0.1522
ASEAN-5 LTRADE does not Granger cause LTHEIL	4	16.7950	4	0.0021**
SAARC-5 LTRADE does not Granger cause LTHEIL	1	0.1483	1	0.7002
ASEAN-5 LTHEIL does not Granger cause LTRADE	4	36.8628	4	0.0000***
SAARC-5 LTHEIL does not Granger cause LTRADE	1	2.2396	1	0.1345

Table 3. Results of Granger Causality Test: ASEAN-5 and SAARC-5 Countries.

\*\* significant at the 5% level; \*\*\* significant at 1% level;  $p$  is the lag length, which is selected by AIC, for the causality model. L is Log.

The result of the Granger causality test of SAARC-5 countries is shown in Table 3. Firstly, the null hypothesis that trade does not “Granger cause” GNI cannot be rejected at the 5% level ( $p$ -value: 0.1008). Similarly, the null hypothesis that GNI does not “Granger cause” trade cannot be rejected at the 5% level ( $p$ -value: 0.1522). Therefore we may conclude that there is no causal relationship between trade and GNI in the SAARC-5 countries. Secondly, the null hypothesis that trade does not “Granger cause” GNI cannot be rejected at the 5% level ( $p$ -value: 0.7002), and the null hypothesis that income inequality does not “Granger cause” trade cannot be rejected at the 5% level ( $p$ -value: 0.1345). We cannot establish a causal relationship between trade and income inequality in the SAARC-5 countries.

## 6. Conclusion

This study demonstrated that multi-lateralism and RTAs are complementary and that regional income convergence is likely with a like-minded and committed regionalism with cultural and geographical links. The complexity of this link between openness and income convergence has not been fully captured in the existing literature although our study shed

some light by revealing the experiences of ASEAN and SAARC countries. The expectation is that reforms (both multi-lateral and RTAs) tend to allocate resources as the quotas and tariffs in traditionally protected sectors are removed, and to motivate the convergence of regional income in the light of the factor price equalisation theorem. Regardless of multi-lateralism or RTAs, it is likely that countries within the RTAs integrate more due to the potential advantages of ethnic and cultural links, and lower transport and transaction costs. By applying the Lumsdaine and Papell (1997) model for detecting breaks in the trend function of uni-variate trade performance time series data (trade per person), we found significant trend breaks in 1987 and 1999 which coincided with economic reforms initiated by individual member countries of ASEAN-5, and recovery from the Asian crisis that focused on multi-lateralism respectively. The significant break in 1987 is an indication that multi-lateralism had a greater impact on trade in the region. A significant trend break occurred in the GNI per capita in 1998, which coincided with a recovery from the Asian crisis of 1997. The Asian crisis and recovery in 1997 -1998 imitates the co-movement properties of sectoral outputs in the ASEAN region as a result of intense integration into the region. It is relevant to note that Kose (2002) argued that world price shocks account for a significant proportion of business cycle variability in small, open, developing countries. Our results from the Granger causality test show that there is a one-way causal relationship flow from GNI to trade. If causality is assessed at an early stage then trade flows could lead to income, but this may be reversed at a later stage when increases in income increase the capability of poor countries in the region to import and export.

The analysis showed that the break points for the Theil values in 1981 and 1989 coincided with the oil crisis and economic reforms by individual countries respectively. The results from the Granger causality test indicated that there is a two-way causal relationship between the flow from trade to convergence and convergence to trade. The result deviated slightly from that of Ben-David (1996), who argued that trade liberalisation induces income convergence. It is the view that if causality is assessed at an early stage of development then flows of trade could appear to be leading to income convergence. However, this could be reversed at a later stage when income convergence increases the trade capability of poor countries in the region.

By applying the Lumsdaine and Papell approach for detecting breaks in the trend function of uni-variate trade per person time series data (proxy for trade and foreign investment) for SAARC-5 countries, we found significant break points in trade per person in 1992 and 2002. These break points coincide with India's attempt at multi-lateral trade liberalisation (India is the largest nation in the region and contributes 80% of the overall GNI) and more bi-lateral dealings inside and outside SAARC member countries respectively. The significant trend break in 1992 indicated that multi-lateralism had a greater impact on trade in the region and tended to unite the SAARC countries in economic cooperation. The global commitments can be viewed as a strengthening rather than a detrimental force for the region. A significant trend break occurred both in income per capita and trade per person in 2002, which coincided with India having more bi-lateral trade agreements with Sri Lanka, Singapore, Thailand, Malaysia, Mercosur and the ASEAN. It is relevant to note that the World Bank (2006:1) described the India-Sri Lanka FTA in 2000 as 'the most effective free trade area in existence'.

Econometric analysis of SAARC-5 countries showed that the break points for the Theil value (representing convergence/divergence) in 1985 and 2000 coincided with the oil crisis in the

mid 1980s, and the engagement of more bi-lateral RTAs in the early 2000s, respectively. Both events increased income divergence among individual SAARC- 5 countries and in the region as a whole. It is relevant to note that Backus and Crucini (2000) argued that from 1972 to 1987 the dramatic changes in the relative price of oil drove the terms of trade. Uncertainty in oil prices and increasing costs in international transportation in the mid-1980s can be associated with widening income gaps within the region. An immediate effect of increased trade agreements due to bi-lateral trade agreements in the early 2000s was the widening income gap in the region. India has entered into many bi-lateral trade agreements that coincided with regional income divergence, which is contradictory to the original objective of SAARC.

There is a two-way casual relationship in ASEAN-5 countries between the flow from trade (both multi-lateral and regional) to regional income convergence and vice versa. The global commitments of ASEAN-5 countries can be viewed as a strengthening rather than a detrimental force for the region. The advantages of similar cultural values, low wages, low transaction and transport costs, and strong fundamentals, promoted export oriented foreign investments and exports that led to increased regional efficiency (technical, allocated and trade efficient) among the ASEAN-5 countries that eventually led to income convergence in the light of Solow perspectives. ASEAN is a unique case in this sense. We cannot establish a similar causal relationship between increased trade and convergence in SAARC-5 countries. Bandara and Yu (2003) used the GTAP model to argue that SAFTA would not benefit the region economically because they cannot meet at summits due to political conflicts. Regional economic and political integration among SAARC member countries is not enough to utilise the advantage of similar cultural values, low wages, and low transaction and transport costs. In this sense the South Asian Association of Regional Cooperation (SAARC) needs a more radical approach to eliminate trade barriers at both regional and multi-lateral levels in order to converge more successfully.

It is important to note that our tests were only concerned with two breaks in the series and were unable to detect more than two structural breaks. We acknowledge the limitations of the unit root test due to its low power in rejecting the null hypotheses on  $I(1)$ , particularly when there are relatively few degrees of freedom. Our analysis incorporated a low degree of freedom when estimating equations. The findings are highly specific to the ASEAN-5 setting so the general limitations on a focused case study research still apply. This sort of analysis rarely gives conclusive results. The models need to be developed further to capture more of the impacts of RTAs and multi-lateralism.

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This book, edited by the Intech committee, combines several hotly debated topics in science, engineering, medicine, information technology, environment, economics and management, and provides a scholarly contribution to its further development. In view of the topical importance of, and the great emphasis placed by the emerging needs of the changing world, it was decided to have this special book publication comprise thirty six chapters which focus on multi-disciplinary and inter-disciplinary topics. The inter-disciplinary works were limited in their capacity so a more coherent and constructive alternative was needed. Our expectation is that this book will help fill this gap because it has crossed the disciplinary divide to incorporate contributions from scientists and other specialists. The Intech committee hopes that its book chapters, journal articles, and other activities will help increase knowledge across disciplines and around the world. To that end the committee invites readers to contribute ideas on how best this objective could be accomplished.

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