

# Bilateral Trade and Per Capita Income Convergence of Selected South Asian countries and among their ‘Major Trade Partners’

Ahmed Nawaz Hakro<sup>a</sup>  
Bashir Ahmad Fida<sup>b</sup>

<sup>a</sup> Visiting Scholar, Depart. Of Economics, University of Glasgow, Glasgow,UK  
e-mail: hakro@qau.edu.pk

<sup>b</sup> Graduate Student, Shanghai University Of Finance And Economics (Shufe), Shanghai, China

## ABSTRACT

This study determines the existence and magnitude of bilateral convergence of per capita income of ‘selected’ South Asian countries and among their ‘major trade partners’<sup>1</sup>. Bilateral convergence is characterized by reduction in income differentials within the group of trading partners. Three approaches; intra-trade convergence, bilateral trade convergence, and difference approach (fixed and common forms) have been used. The results of fixed effect model- trade increases between the groups, per capita income differential decreases. Results of bilateral convergence approach demonstrate that bilateral trade ratio does not seem to affect the bilateral income difference significantly in any direction. Under difference in difference approach convergence rates-sigma convergence of per capita income convergence both pre-post liberalization periods has converged. However, convergence occurred only in post liberalization period for Asian economies. The panel data of sigma convergence by using fixed effect model demonstrate that convergence rate has been accelerated in Asian economies. However, the rate of convergence process has been decelerated over the post-liberalization period in whole sample countries.

## Introduction

The vast body of literature has been written regarding the extent of income convergence and divergence among the countries, for example (main stream cross country growth regressions studies- Baumol (1986), Dowrick and Nguyen (1989), Barro (1991), Levine and Renelt (1992) etc. One set of studies used beta convergence (regression towards the mean) by Barro (1984, 1992), Baumol (1986), and DeLong et al. (1988)) and other set of studies used sigma convergence (concerns cross section dispersion) measured by Easterlin (1960), Barro (1984), Dowrick et al. (1989). Evidence demonstrates higher incidence of income convergence in some subsets of countries and other subsets display no convergence tendencies among the wealthier countries Baumol, (1986 and 1989), Baldwin (2003) and Ben-David (1993, 1994b). Some of the studies based on endogenous growth literature<sup>2</sup> also demonstrate lack of income convergence for example Romer (1986), Lucas (1988), but there is strong evidence of

---

<sup>1</sup> The selected South Asian countries mean Pakistan, India, Bangladesh, and Srilanka. The Advanced countries and some Asian countries have been considered here as the major trade partners of Selected S.A’s countries. These advanced countries include: USA, UK, Newzland, Australia, Japan, Canada, Austria, Belgium, Denmark, Finland, France, Austria , Germany, Greece, Ireland, Italy, Netherlands, Portugal, Sweden, Switzerland and Norway. Asian countries include Hong Kong, Indonesia, Malaysia, Korea, and Singapore.

<sup>2</sup> International trade can affect the economic growth rate, but the effects may be considered as ‘level effect’ or ‘growth effect’ or both pioneered by Romer (1986) and Lucas (1988)-(technology is endogenously driven because investment in research and development advances technology responds to market incentives). Romer and Batiz (1991) carefully distinguished level effects from growth effects. Rodrick (1996) argued ‘trade restrictions have level affects, but no growth effects. That is, a twenty percent tariff may reduce five percent of GDP, but it will not affect the long run growth rate of the economy’.

*conditional* convergence<sup>3</sup> in the studies such as Barro (1991), Mankiw, Romer and Weil (1992), Levine and Renelt (1992), these studies also pointed out a number of factors such as human capital, government policies and other variables should be accounted for. Other studies such as Grossman and Helpman (1991) present that trade can contribute the local knowledge stock, new ideas etc, Baldwin et al. (2001) argue that exogenous falling cost of trade results in a technological externalities in the north. In contrast to most endogenous models, Theo Eicher (1999) endogenous model result in income convergence while Young (1991) argued income disparity increases between rich and poor countries. Kravis (1970) also argued that trade is one among many factors affecting growth, and it is unlikely to be the dominant variable in many instances. In a more refined analysis, Corden (1971) combines the traditional theory of gains from trade with the growth models of (Solow (1950) Swan (1956)), and argued that trade not only produces static gains but also increases capital accumulation, which cause high growth of per capita output. (Corden 1971) implies that a country that moves from autarky to free trade attains a higher steady-state income and as a result grows faster during the transition period. Johnson (1967) in context of Hickscher-Ohlin model, views the interplay of trade and growth from a very different perspective of Corden. These influential contributions, reviewed above, did not settle the debate over the level and growth effects of trade.<sup>4</sup> In addition to this, traditional growth literature, neoclassical growth model-Solow model (Solow, 1956) and Cass and Koopmans (1965) modifications implies that differences in initial capital labour endowments will be eliminated over time, and will lead convergence in per capita incomes. Many studies (such as Barro and Martin (1992), Mankiw (1992) tested this hypothesis across the regions in the context of Solow (1956) where each country reaches its steady growth level independent of each other.

The development of modern trade theory and neoclassical growth theory made it possible for scholars to integrate the two theories and shed light on the interplay of trade, growth, and income disparity. Moreover, the availability of international data on purchasing power parity, for almost all countries, makes empirical studies possible. The development of endogenous growth theory and the practical experience regarding the effects of international trade policies on income level and economic growth encouraged research on trade-growth and income disparity relationship.

In this connection, some recent studies such as Sachs and Warner (1995), Ben-David (1993, 1998, 2000, and 2004)] incorporated the role of international trade and liberalization in examining the convergence hypothesis. These studies argue that trade liberalization cause per capita income convergence. The suggested channel is that trade liberalization increases competition and absorption capacity of foreign knowledge and ideas for domestic firms to the extent that knowledge levels among the countries converge to a common level, and it leads to per capita income convergence. On the other hand Slaughter (1997) from perspective of traditional trade theory, the Factor Price Equalization (FPE) theorem<sup>5</sup> provides the base to equalize the factor prices when certain conditions are fulfilled. Per capita income can still diverge, when the factor quantities across the countries are dissimilar, even if FPE theorem holds.<sup>6</sup> Shibata and Parikh (2004), panel data methodology and the concepts of beta-convergence and sigma-convergence are used for pre-post liberalized eras. Single difference and difference-in-differences approaches are also used and concluded that unconditional beta-

<sup>3</sup> the greater is the gap between its initial per capita income level and its own long run per capita income level, the faster the rate of convergence.

<sup>4</sup> some economists working in this area doubt whether trade has growth effect. For example, Dollar and Kraay (2001), Srinivasan, (1999,). In the context of the Cass-Koopmans model, Srinivasan viewed 'that one can obtain a positive long run growth effect of trade liberalization' conditioned on 'a production function in which the marginal product of capital is bounded below by a sufficiently high positive value as capital labour- ratio goes to infinity' Srinivisan (1999).

<sup>5</sup> Samuelson (1971) showed that in the standard specific-factors framework free trade can generates convergence. Mukhtari and Rassekh (1988) found that factor price equalization theorem hold for sixteen OECD countries for the period 1961-1984.

<sup>6</sup> Slaughter (1997) has briefly discussed this point.

convergence test resulted no evidence of accelerating or decelerating convergence after liberalization for Asian economies, where as, sigma-convergence shows significant convergence of per capita income. Difference-in-differences approach describes significant convergence. Dynamic models estimated by panel fixed effects and GMM estimation shows no evidence of acceleration or deceleration in convergence. An association between convergence and openness across history noted by Williamson (1993) argues that convergence and global economic integration have been associated since 1850. In the two sub periods that see relatively free movements of goods and factors, 1870-1913 and post-1950 there is evidence of convergence. In the period of restricted global trade between the two gaps one does not find evidence for convergence. Empirically evidence by Winter and David (1999) show that there is no evidence that countries, in general, are converging in per capita incomes. In fact, the income gaps appear to be growing over time.

Some points deserve emphasize regarding the foregoing papers. First, the mixed empirical results resemble the theoretical models on trade and convergence, both the theory and empirics leaves us uncertain on whether trade leads to income convergence. Second, the results are inconclusive and insufficient to determine the convergence or divergence within the trading group of countries and the general link between the magnitude of trade and the income convergence particularly the countries in South Asia. Third, no study has been taken to determine the bilateral convergence of South Asian countries which are experiencing trade liberalization<sup>7</sup>. Fourth, most of the studies regressed growth rates on initial level of income and other factors to determine the convergence. Fifth, most of the studies suffer from endogeniety problem of relationship between trade liberalization and income convergence; it is the former that produces the latter, rather other way around<sup>8</sup>. Last but not the least if the trade liberalization produce convergence it should be evident within the group of countries which comprise major trade partners rather randomly selected countries to determine the convergence. The purpose is to test the impact of bilateral trade and intra trade relationship after liberalization on bilateral and intra group per capita income differentials in an individual country cases and its major trade partners, and to examine whether the concerned Asian economies- have experienced convergence or divergence during the sample period.

Rest of the paper is organized, as section II discussed the methodology and framework for analysis, Section III consisted of discussion and empirical results, concluding remarks with policy implications are summarized in the last section V.

## **II. Methodology**

We applied different types of approaches, models, and tests to examine bilateral per capita income convergence among the trade partner countries both before and after liberalization period. Several measures of trade indicators such as Sachs –Warner Index, Lerner Open Index, growth rate of exports, tariff averages, collected tariff ratios, black market premium, etc. have been used in different studies, but we use the most common openness index –trade dependency ratio (i.e. the ratio of export and imports to GDP) in bilateral term<sup>9</sup>. The period of pre-liberalization and post- liberalization is defined as follows: Pre-liberalization period

---

<sup>7</sup> The only study Shibata and Parikh (2004) on different regions (not included Pakistan and Bangladesh) used Beta and Sigma convergence and difference-in difference approach for Africa, Asia and Latin America in general and found no beta convergence in Asian countries and convergence in sigma and difference-in-difference approach.

<sup>8</sup> Jeffrey Frankel and David Romer (1999) have tackled the endogeniety problem by employing a gravity model and creating an instrument based on other countries, sharing a common border, and landlocked-ness. In another paper Frankel and Rose (2002) test the hypothesis that a currency union stimulates trade among its constituent units, and the hypothesis that trade and turn stimulates output. Rodrigues and Rodrik (2001) have criticized the papers of Frankel and Romer and infer that FR constructed share is not a valid instrument. For interesting debate on endogeniety refer other studies such as Sachs (2003), Roderick (2002) Tervio and Irwin (2002) Cyrus, T. (2004), Ben David (1996) etc.

<sup>9</sup> See for detail Mc Culloch et .al (2001).

consists of the sample years 1972 to 1988. Post-liberalization period consists of the sample years 1989 to 2004.

Data on per capita income (in US\$ constant at 2000) and GDP data has been taken from The World Development Indicators (2005). Bilateral trade data has been collected from the various volumes of Direction of Trade Statistics of IMF publications.

## Trade and income Convergence Approaches

### Intra-Group Convergence Approach<sup>10</sup>

The trade groups based on exports and imports have been constructed. In our case, we have four (India, Pakistan, Sri Lanka, Bangladesh) source countries, and for each one there are 29 trade partners. First five years are considered as initial period. Eight trade groups were constructed on the basis of exports, and eight trade groups on the basis of imports. Thus, each source country has 4 trade groups, so we have total 16 trade groups. The details of the groups are as follows:

#### Trade groups based on exports for each source country:

- Group 01: Includes all those trade partners who had imported more than 4% of the exports of the source country during first five initial years.
- Group 02: Includes all those trade partners who had imported less than 4% of the exports of the source country during first five initial years.

#### Trade groups based on imports for each source country

- Group 01: Includes all those trade partners from which the source country imported more than 4% of its imports during first five initial years.
- Group 02: Includes all those trade partners from which the source country imported less than 4% of its imports during first five initial years.

Total volume of the intra-trade group is calculated for the each export-based group and import based group for each year over 1972-2004. To get a measure of how trade of the source country with its trade partners grew relative to its GDP, the total intra-trade is divided by the GDP of the source country. This ratio, represented by the variable  $R_{i,t}^g$  (where  $i$  stands for source country and  $g$  denotes the group as being export-based or import based) is calculated for each of the 16 groups for each of 32 years. When intra-group trade ratio  $R_{i,t}^g$  at the sample period regressed on trend ( $T_t$ ). The equations are as follows:

$$R_{it}^x = \alpha_{1,i}^x + \alpha_{2,i}^x T_t + \varepsilon_{it}^x \quad (1)$$

$$R_{it}^m = \alpha_{1,i}^m + \alpha_{2,i}^m T_t + \varepsilon_{it}^m \quad (2)$$

Where  $x$  and  $m$  denotes the export and import-based groups respectively, and  $i$  denotes the  $i$ th source country. The behaviour of the intra-group income differential examined through the standard deviation ( $\sigma_{i,t}^g$ ) of the natural log of the real per capita incomes of the concerned trade group. Groups exhibiting convergence would be expected to have declining standard deviations. On the other hand, groups exhibiting divergence would be expected to have increasing standard deviations over time. The following equations are regressed on the trend ( $T_t$ ).

$$\sigma_{it}^x = \beta_{1,i}^x + \beta_{2,i}^x T_t + \mu_{it}^x \quad (3)$$

$$\sigma_{it}^m = \beta_{1,i}^m + \beta_{2,i}^m T_t + \mu_{it}^m \quad (4)$$

The trend coefficients on the trade ratios ( $R_{i,t}^g$ ) and the trend coefficient on the income differentials provide an indication of the magnitude of the change in each variable during the

<sup>10</sup> For intra-group convergence and bilateral convergence the approach has been used which is used by Ben-David (2004).

specified time. To capture this relationship the data for trade groups pooled once for exports and once for imports and the following equations are estimated:

$$\sigma_{it}^x = \alpha_{1,i}^x + \alpha_{2,i}^x R_{it}^x + U_{it} \quad (5)$$

$$\sigma_{it}^m = \alpha_{1,i}^m + \alpha_{2,i}^m R_{i,t}^m + U_{it} \quad (6)$$

For income convergence the expected signs of  $\alpha_{2,i}^x$  and  $\alpha_{2,i}^m$ , should be negative, indicating as trade ratio increases income differences decreases. The relationships between the changes in trade ratios and the changes in income differentials have been measured through these equations:

$$D\sigma_{it}^x = \lambda_{1,i}^x + \lambda_{2,i}^x DR_{it}^x + v_{it}^x \quad (7)$$

$$D\sigma_{it}^m = \lambda_{1,i}^m + \lambda_{2,i}^m DR_{it}^m + v_{it}^m \quad (8)$$

Where x and m identifies export and import based groups respectively. The coefficients  $\lambda_{2,i}^x$  and  $\lambda_{2,i}^m$  are expected to have negative signs for income convergence.

### Effect of Trade-liberalization in case of intra-trade convergence

We introduced dummy variable for the pre and post liberalization periods, dummy variable (dum= 0) for pre and (dum =1) for post trade-liberalization periods. We estimate the following equations for each of trade groups by OLS.

$$\sigma_{it}^x = \alpha_{1,i}^x + \alpha_{2,i}^x R_{it}^x + \alpha_{3,i}^x \text{dum} + U_{it}^x \quad (9)$$

$$\sigma_{it}^m = \alpha_{1,i}^m + \alpha_{2,i}^m R_{it}^m + \alpha_{3,i}^m \text{dum} + U_{it}^m \quad (10)$$

Where x and m identifies the export and import based groups, and i denotes the *ith* source country.

### Bilateral Convergence Approach

For this purpose, focus is on the bilateral relationships, in terms of trade and per capita income difference, between each pairs of trade partners<sup>11</sup>. To capture this relationship the volume of bilateral trade between each source country (as in our case it is each South Asian country) and each of its trade partners is divided by the source country's total GDP. The log of this ratio  $R_{ij,t}$  is calculated for each of 29 pairs for one source country and 116 pairs for four countries for each of 32 years. The income gap,  $Y_{ij,t}$ , measures the annual differences of the per capita income between each source country and each trade partners over the sample period. If the source country is wealthier, then the gap is positive, otherwise, the gap is negative. In our sample, most countries are wealthier than the source countries, so this gap is negative (in terms of source country). It is obvious that income gap between advance country and developing country is negative (in the terms of latter), but whether these income gaps decrease or increases as trade volume increases. The purpose is to check the bilateral relationship across the individual trade groups, so we estimated the following equation for each source country.

$$Y_{ij,t} = \alpha_{1i} + \alpha_{2i} R_{ij,t} + \mu_{ijt} \quad (\text{Fixed Effect}) \quad (11)$$

<sup>11</sup> For instance, to see the relationship of trade between Pakistan and USA and per capita income gap over the sample period. We considered major four countries as source countries and construct the pairs for each member from the sample countries.

$$Y_{ij,t} = \alpha_1 + \alpha_2 R_{ij,t} + \mu_{ijt} \quad (\text{Common Effect}) \quad (12)$$

We applied panel data technique-Fixed Effect Model (FEM) for estimation. However, the results of Common Effect Model (CEF) are also reported for comparisons. To what extent changes in trade ratio affects the changes in income differential; the following equation is estimated for this purpose.

$$\Delta Y_{ij,t} = \alpha_1 + \alpha_2 \Delta R_{ij,t} + \varepsilon_{ij,t} \quad (\text{Fixed Effect}^{12}) \quad (13)$$

$$\Delta Y_{ij,t} = \alpha_1 + \alpha_2 \Delta R_{ij,t} + \varepsilon_{ij,t} \quad (\text{Common Effect}) \quad (14)$$

The basic framework for this is as follows: A common formation of the model assumes that differences across units can be captured in differences in the constant term.<sup>13</sup>

$$Y_i = \mathbf{i}\alpha_i + \mathbf{X}_i\beta + \varepsilon_i \quad (15)$$

Collecting these terms gives

$$\begin{pmatrix} y_1 \\ y_2 \\ \vdots \\ \vdots \\ \vdots \\ V_n \end{pmatrix} = \begin{pmatrix} i & 0 & \dots & 0 \\ 0 & i & \dots & 0 \\ & & \ddots & \\ & & & i \end{pmatrix} \begin{pmatrix} \alpha_1 \\ \alpha_2 \\ \vdots \\ \vdots \\ \alpha_n \end{pmatrix} + \begin{pmatrix} X_1 \\ X_2 \\ \vdots \\ \vdots \\ X_n \end{pmatrix} \beta + \begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \vdots \\ \varepsilon_n \end{pmatrix}$$

$$\text{Or } y = [d_1 \ d_2 \ \dots \ d_n \ X] \begin{pmatrix} \alpha \\ \beta \end{pmatrix} + \varepsilon$$

Where  $d_i$  is a dummy variable indicating the  $i$ th unit (in our case the trade ratio with  $i$ th country).

$$Y = D\alpha + X\beta + \varepsilon \quad (16)$$

This model usually referred to as the least square dummy variable (LSDV) model.

### Difference Approach

Typical difference-in-differences approach by following Meyer (1994), and Slaughter (2001), we applied this approach to our sample data. According to the approach, when some economic agents apply some treatment at a single point in time, and some outcome can be observed both for before and after treatment application<sup>14</sup>. The treatment effect can be estimated with the following regression:

$$Y_{it} = \alpha + \beta d_{it} + e_{it} \quad (17)$$

$Y_{it}$  is the outcome for agent  $i$  ( $i = 1, \dots, N$ ) at time  $t$  ( $t=0$  or  $1$ ).  $d_{it}$  is a dichotomous variable equal to one if  $t = 1$  and zero if  $t = 0$  and  $e_{it}$  is an error term, (whose variance varies by  $t$ ).  $\beta$  identifies the effect of treatment, under the assumption that  $E(e_{it}|d_{it}) = 0$ ,  $\beta$  can be

<sup>12</sup> The fundamental advantage of a panel data set over across section is that it will allow the researcher for greater flexibility in modeling differences in behavior across individuals.

<sup>13</sup> See Green (1995) for details.

<sup>14</sup> See detail in Slaughter(2001).

obtained by simply by estimation of equation, and by calculating the single difference of the change in mean outcomes before and after treatment (i.e. average outcome at t=0 and average outcome at t=1).

### **The Difference approach applied to trade liberalization**

This approach to trade liberalization, the outcome of our interest is to measure of per capita income dispersion. We divided our data into two periods defining pre-trade liberalization and post- trade liberalization. We tried to examine whether per capita income convergence has occurred or not during the two periods, and what is the difference in the rate of convergence. Convergence in this context is the declining of standard deviation of per capita income after liberalization process. The concept concerns ‘Cross-sectional dispersion’. In this context, convergence occurs if the dispersion measured by the standard deviation of the natural logarithm of real per capita income across a group of country or region declined over time or not. We constructed three major groups for the analysis. First group consists of the whole sample countries. The second group consists of the only Asian economies, and the third group consists of four selected economies. For this dispersion measure, we estimated the equation (17) as follows:

$$\sigma_{rt} = \alpha_1 + \alpha_2(d_r) + \beta_1(t) + \beta_2(t)(d_r) + e_{rt} \quad (18)$$

Where  $d_r$  is a dichotomous variable equal to one if the time period is a liberalized period while it equal 0 for the non-liberalized period,  $t$  index the time in years,  $e_{rt}$  is an error term where variance varies by  $r$ .  $\sigma_{rt}$  is the standard deviation of the natural log of per capita income among the liberalizing countries for regime  $r$  at time  $t$ . The rate of change in income dispersion for pre-liberalization is given by  $\beta_1$  and for post-liberalization period it is given by  $\beta_2$  in both regimes, income convergence /divergence is represented by negative (positive) slope coefficients. The single difference  $\beta_2$  indicates whether post-liberalization convergence differs from that of pre-liberalization. Equation is basically a spline regression where both regimes are allowed to have different intercepts and parameters on time. We estimated the equation (18) for both periods and for all groups separately.

### **Difference approach using panel data**

Our second measure of income dispersion, under the different approach, is how quickly each country’s income level is converging to the average of that country group? Following Ben David (1993) and Slaughter (2001), we used the following model.

$$Y_{it} - Y_{bart} = \gamma (Y_{it-1} - Y_{bart-1}) \quad (19)$$

Where,  $Y_{it}$  is country’s log of real per capita income in year  $t$ ,  $Y_{bart}$  is the average of  $Y_{it}$  for each period and  $\gamma$  is a parameter relating the average income gape form one year to next year.

Defining  $W_{it} = Y_{it} - Y_{bart}$  and  $\Delta W_{it} = (W_{it} - W_{it-1})$

The equation 19 can be manipulated as follows.

$$\Delta W_{it} = \gamma_1(W_{it-1}) + \gamma_2(d_r) + V_{rit} \quad (20)$$

Where,  $\gamma_1 < 0$  represents the rate of convergence.

For the difference analysis, we can write the equation 20 as

$$\Delta W_{it} = \gamma_1(W_{it-1}) + \gamma_2(dr) + \gamma_3(W_{it-1})(dr) + V_{rit} \quad (21)$$

Where,  $r$  denotes the region (Pre Vs. Post liberalization),  $dr$  is defined as before,  $V_{rit}$  is the error term whose variance changes across  $r$ . The parameter  $\gamma_3$  indicates whether post-liberalization convergence differs from that of pre-liberalization. In this case, again we have three groups. Group one consists of whole sample countries. Group two consists of Asian countries and Group three includes four selected countries.

### III. Discussion and Empirical Results

For intra-trade convergence, 1-8 equations are estimated, the results are reported in table I to IV. The results of trend behaviour of intra trade ratio of export base-groups and import-based groups (equation 1 and 2) over time are reported in table 1. The coefficients of trade ratio have positive signs for all groups, indicating increase of trade ratio over time. Eight exports groups (except Group 01 for Pakistan) have positive significant trade ratio coefficients. The import-based groups also show the increasing trend of trade ratio over the sample period. The behaviour of per capita income differences in terms of standard deviation, of the natural log of the per capita income, (equations 3 and 4), the results in table II show that the trend coefficients of the income differences are negative which indicates that standard deviation of the per capita income among all the trade groups (except in case of Bangladesh G01, where the coefficient is significant positive) declines over the sample period 1972-2004. Both of table demonstrate that over the time intra trade increases along with decreases in intra income differentials.

**Table I Regression of Groups Trade Ratio on Trend**

Export-based groups $R^x_{it} = \alpha_{1,i}^x + \alpha_{2,i}^x T_t + \varepsilon^x_{it}$				Import-based groups $R^m_{it} = \alpha_{1,i}^m + \alpha_{2,i}^m T_t + \varepsilon^m_{it}$		
Source Country	$\alpha_{1,i}^x$	$\alpha_{2,i}^x$	R <sup>2</sup>	$\alpha_{1,i}^m$	$\alpha_{2,i}^m$	R <sup>2</sup>
Pakistan G01	12.091 (19.34)*	0.0163 (0.50)	0.007	9.945 (19.83)*	0.0145 (0.54)	0.009
India G01	3.50 (12.38)*	0.098 (6.49)*	0.57	3.36 (13.45)*	0.080 (5.97)*	0.53
Sri Lanka G01	13.7 (10.31)*	0.488 (7.12)*	0.62	13.68 (10.54)*	0.587 (8.41)*	0.69
Bangladesh G01	2.81 (7.63)*	0.196 (9.97)*	0.76	3.41 (13.51)*	0.163 (12.06)*	0.82
Pakistan G02	4.30 (11.5)*	0.123 (6.15)*	0.54	6.44 (12.68)*	0.125 (4.600)*	0.41
India G02	0.55 (2.58)*	0.16 (14.58)*	0.87	0.68 (12.68)*	0.186 (4.59)*	0.87
Sri Lanka G02	5.05 (5.88)*	0.53 (11.64)*	0.81	3.26 (4.33)*	0.44 (10.99)*	0.80
Bangladesh G02	2.74 (12.99)*	0.20 (17.85)*	0.91	2.13 (8.20)*	0.23 (16.8)*	0.90

t-statistics are in parenthesis. The number of observations is 33 in each of the estimations.

\*  $x$  and  $m$  denote trade groups based on exports and imports respectively.

**Table II Regression of Groups Income Differentials on Trend**

Export-based groups $\sigma^x_{it} = \alpha_{1,i}^x + \alpha_{2,i}^x R^x_{it} + U_{it}$				Import-based groups $\sigma^m_{it} = \alpha_{1,i}^m + \alpha_{2,i}^m R^m_{it} + U_{it}$		
Source Country	$\alpha_{1,i}^x$	$\alpha_{2,i}^x$	R <sup>2</sup>	$\alpha_{1,i}^m$	$\alpha_{2,i}^m$	R <sup>2</sup>
Pakistan G01	1.83	-0.0041	0.79	1.83	-0.0019	0.45



	(257.95)*	(-10.86)*		(263.1)*	(-5.10)*	
India G01	1.67 (208.55)*	0.0040 (-9.46)*	0.74	1.82 (228.2)*	-0.004 (-9.64)*	0.74
Sri Lanka G01	1.44 (338.46)*	-0.004 (-21.04)*	0.93	1.25 (323.5)*	-0.003 (-18.9)*	0.92
Bangladesh G01	1.55 (222.93)*	0.0013 (3.54)*	0.28	1.91 (175.3)*	0.002 (4.19)*	0.36
Pakistan G02	1.06 (168.6)*	-0.004 (-10.86)*	0.86	1.22 (163.49)*	-0.005 (-13.3)*	0.85
India G02	1.32 (252.3)*	-0.006 (-21.5)*	0.74	1.29 (252.7)*	-0.0059 (-21.6)*	0.93
Sri Lanka G02	1.43 (314.7)*	-0.005 (-23.7)*	0.90	1.30 (169.6)*	-0.006 (-16.8)*	0.90
Bangladesh G02	1.33 (280.6)*	-0.0043 (-17.08)*	0.90	1.29 (255.08)*	-0.004 (-16.7)*	0.90

t-statistics are in parenthesis. The number of observations is 33 in each of the estimations.

\*  $x$  and  $m$  denote trade groups based on exports and imports respectively.

**Table III Relationship between Trade Ratio and Income Differences**

Name of group	Estimated Equation No.	Coefficients of trade ratios.	$R^2$	Number of observations
Exports groups	3.8	-0.080 (-15.94)*	0.97	264
Imports groups	3.9	-0.0907 (-15.52)*	0.98	262

t-statistics are in parenthesis. \* denotes significant at 5%.

In equations 5 and 6, the results for export and import based groups in above (table III), show that there is a significant negative relationship between intra trade ratio and per capita income differences in case of both export-base and import-base trade groups. The coefficient of trade ratio<sup>15</sup> in export base groups is 0.08 and for import base group 0.09.

**Table IV Relationships between changes in trade and changes in income differences**

Name of group	Estimated Equation No.	Coefficients of trade ratios.	$R^2$	Number of observations
Exports groups	3.10	-0.0011 (-0.344)	0.080	256
Imports groups	3.11	-0.0021 (-0.53)	0.086	254

t-statistics are in parenthesis.

<sup>15</sup> Shows that if there is one unit increase in intra trade then intra income differences will decline by 0.08 of unit. Similarly, the coefficient of trade ratio in import base groups shows that if there is one unit increase in intra trade then intra income differences will decline by 0.09 of unit.

The result of the equations 7 and 8 are in table IV. For both trade groups show that there is a negative relationship between the changes in the trade ratios and changes in the income differences over the sample period 1972-2004, but this relationship is not significant. So trade has the negative dynamic relationship between the income differences over time, but insignificant. We re-estimated the equations (7) and (8) by introducing the dummy variable (dum=0 for pre and dum=1 for post trade-liberalization). We estimate the equations (09) and (10) separately for each of intra trade group by using system through least square methods. Results are reported in tables V and VI.

**Table V Results of Trade Liberalization Effects for exports groups**

$$\sigma_{it}^x = \alpha_{1,i}^x + \alpha_{2,i}^x R_{it}^x + \alpha_{3,i}^x dum + U_{it}^x$$

Trade Group	$\alpha_{1,i}^x$	$\alpha_{2,i}^x$	$\alpha_{3,i}^x$	R <sup>2</sup>
Pakistan G01	1.73 (18.8)*	0.025 (0.69)	-0.07 (-7.45)*	0.33
Pakistan G02	1.11 (22.03)*	-0.055 (-1.83)	-0.058 (-4.14)*	0.74
India G01	1.65 (27.35)*	-0.006 (-0.15)	-0.069 (-3.32)*	0.60
India G02	1.32 (128.81)*	-0.07 (-4.80)*	-0.038 (-2.48)*	0.91
Bangladesh G01	1.59 (59.58)*	-0.020 (-1.11)	0.03 (2.51)*	0.24
Bangladesh G02	1.38 (95.33)*	-0.057 (-6.01)*	-0.044 (-6.49)*	0.91
Sri Lanka G01	1.56 (34.46)*	-0.057 (-3.58)*	-0.052 (-5.03)*	0.73
Sri Lanka G02	1.47 (78.92)*	-0.04 (-5.15)*	-0.066 (-7.29)*	0.93

t-statistics are in parenthesis. The number of observations is 33 in each of the estimations. \* denotes significant at 5% level.

**Table VI Results of Trade Liberalization Effects for imports groups**

$$\sigma_{it}^m = \alpha_{1,i}^m + \alpha_{2,i}^m R_{it}^m + \alpha_{3,i}^m dum + U_{it}^m$$

Trade Group	$\alpha_{1,i}^m$	$\alpha_{2,i}^m$	$\alpha_{3,i}^m$	R <sup>2</sup>
Pakistan G01	1.89 (30.5)*	-0.033 (-1.23)	-0.027 (-3.30)*	0.33
Pakistan G02	1.25 (22.03)*	-0.03 (-1.19)	-0.08 (5.65)*	0.74
India G01	1.83 (35.92)*	-0.031 (-0.83)	-0.061 (-3.34)*	0.60
India G02	1.30 (151.67)*	-0.06 (-6.34)*	-0.04 (-3.34)*	0.91
Bangladesh G01	1.92 (42.90)*	0.003 (0.12)	0.04 (2.93)*	0.43
Bangladesh G02	1.33 (95.43)*	-0.057 (-5.77)*	-0.039 (-4.38)*	0.88
Sri Lanka G01	1.38 (34.83)*	-0.057 (-4.18)*	-0.036 (-3.28)*	0.73
Sri Lanka G02	1.31 (153.78)*	-0.010 (-9.52)*	-0.041 (-3.96)*	0.93

t-statistics are in parenthesis. The number of observations is 33 in each of the estimations. \* denotes significant at 5% level.

The coefficient of the dummy variable has significant negative impact on the income differences in all export-based groups except (Bangladesh in-group 01, where trade liberalization shows positive impact on income differences). Similarly, in case of import-based trade groups seven group out of eight groups showed the trade liberalization effect significantly in terms of declining the standard deviation of the per capita income. The same Bangladesh group 01 shows positive effect of trade liberalization on per capita income. We can conclude from the tables V and VI that trade liberalization causes per capita income differences to decreases in most cases.

## Bilateral Convergence

We estimated equations (11) and (13) through Fixed Effect Model, and equations (12) and (14) through Common Effect Model. The negative signs of coefficients bilateral trade ratios indicate the negative relationship between bilateral trade and bilateral income differences over time. It means that as bilateral trade increases it causes bilateral income differences to decreases. So, significant negative trade coefficient is an indication of bilateral convergence. Similarly, positive significant trade coefficient indicates bilateral per capita income divergence. The results of fixed and common effect model equations are reported in table VII (equation 11-12) and table VIII (equation 13 and 14).

Overall, results of bilateral convergence are insignificant. In one hand, in some cases, trade ratios show positive insignificant relationship between the income differences, and on the other hand, trade ratio demonstrates the negative relationship. Whatever the signs, in our case, bilateral trade does not affect the bilateral income differences significantly. The above equations are also estimated for the both pre-and post liberalization periods, but the findings coincide with the whole sample's results<sup>16</sup>.

We conclude that, in our sample countries, bilateral trade has no significant affect at the income differences over the sample period. Our results are inconsistent with Ben-David (2001)- (bilateral convergence in empirical evidence of advanced countries shows that bilateral trade causes per capita income convergence).

**Table VII Bilateral Trade -Income Differences Simple Relationship  
Estimation Results of Equation (11) & (12)**

Source Country	Fixed effect Model			Common Effect Model			
	$\alpha_{1i}$	AR(1)	N	$\alpha_1$	$\alpha_2$	AR(1)	N
Pakistan	0.0025 (0.26)	0.924 (37.78)	928*	-2.44 (-2.38)	0.0030 (0.335)	0.995 (377.85)	928
India	0.00098 (0.08)	0.99 (55.38)	1242**	-0.149 (-0.05)	-0.002 (-0.02)	0.996 (432.1)	1242
Srilanka	0.0001 (0.015)	0.95 (44.60)	928*	-0.776 (-0.51)	0.003 (0.04)	0.995 (362.2)	928
Bangladesh	-0.010 (-1.50)	0.94 (41.18)	914**	-4.35 (-5.95)	-0.010 (-1.53)	0.993 (339.47)	914

t-statistics are in parenthesis. N-denotes No. of observation in each equation. \*, and \*\* identify balanced and un-balanced panel observations respectively.

**Table VIII Bilateral Trade -Income Differences Dynamic Relationship  
Estimation Results of Equation (13) & (14)**

Source	Fixed effect Model	Common Effect Model

<sup>16</sup> We estimated these equations for pre-post but due to insignificant, results are not reported.

Country	$\alpha_{1i}$	N	$\alpha_1$	$\alpha_2$	N
Pakistan	0.0036 (0.40)	928*	0.003 (0.75)	0.0029 (0.324)	928
India	0.00024 (0.02)	1242**	0.011 (3.56)	-0.001 (-0.09)	1242
Srilanka	-0.0006 (-0.079)	928*	0.009 (2.51)	0.0011 (0.014)	928
Bangladesh	-0.011 (-1.632)	914**	-0.004 (-1.02)	-0.011 (-1.58)	914

t-statistics are in parenthesis. N-denotes No. of observation in each equation.

\*, and \*\* identify balanced and un-balanced panel observations respectively

### Difference Approach

For difference approach equations 18 and 21 are estimated. Equation (18) estimated by using OLS, where we analyze the standard deviation of the log of the per capita income as a measure of convergence in both regimes of pre-and post trade-liberalization for three cases. The results are reported in table IX.

The results of table IX indicate that in whole sample countries case, negative coefficients of pre and post liberalization periods imply the convergence of per capita income in both periods. However, the small absolute value of the coefficient of pre-liberalization period implies that the convergence processes has decelerated in post liberalization period as compare to the pre-liberalization period. In the remaining two cases, the results exhibit absence of convergence in pre-liberalization period. Post-liberalization period is characterized by significant convergence of per capita income in both cases. The results of difference approach analysis show that Asian economies have converged in term of per capita income in post-liberalization period. Similarly, we estimate the equation (21) using the panel data technique - Fixed Effect Model- to determine how quickly each country converge to its group in the context of pre-and post liberalization periods for three cases. The results are reported in table X. The results demonstrate that in each of three cases each country tends to converge to the average level of its group income. The negative value of the parameter  $\gamma_i$  that relate the income level of one period to another indicates convergence process. The absolute value of this parameter reveals that the convergence process is faster in that regime. We calculate this parameter for both regimes of our sample period for each of three cases. In the case of whole sample countries; again we find the same results of previous table IX that pre-trade liberalization convergence process is faster than that of the post-liberalization convergence process. Because the absolute value of the parameter of the convergence is lesser in case of post-liberalization a compare to the pre-trade liberalization. In Asian countries cases, we find that the convergence process has been accelerated in post liberalization regimes. It means that Asian countries began to liberalize their trade regimes; the each country income tends to converge quickly to the income of the group average income level.

**Table IX Difference Approach Using S.D of Per Capita Income**

Case Name	Pre-liberalization convergence rate, $\beta_1$	Post-liberalization Convergence rate, $\beta_2$
Whole Countries	-0.003852 (-9.237)*	-0.003435 (-8.398)*
Asian Countries	0.0091 (9.528)*	-0.0045 (-2.065)*

SAARC Countries	0.00996 (13.439)*	-0.000231 (-4.913)*
-----------------	----------------------	------------------------

t-statistics are in parenthesis, \* denotes significant at 95% level.  
Number of observation are 16 in each case.

**TABLE X Panel Data Estimation of Difference Approach**

Case Name	Pre-liberalization convergence rate, $\gamma_1$	Post-liberalization convergence rate, $\gamma_3$
Whole Countries	-0.0675 (-4.114)*	-0.02543 (-4.3631)*
Asian countries	-0.0767 (-2.524)*	-0.1508 (-4.0617)*
SAARC countries	-0.1105 (-1.8042)	-0.1350 (-2.522)*

t-statistics are in parenthesis, \* denotes significant at 95% level.  
Number of observation are 16 in each case.

#### IV. Conclusion and Policy Implications

This study examined the bilateral per capita income convergence in the context of ‘selected’ South Asian economies and among their trade partners. Three approaches have been used in the study: intra-trade convergence approach, bilateral trade convergence approach, and difference approach (in two forms). Under intra trade approach, the results show that intra trade ratio increases over the sample period and intra income differential (measured in terms of standard deviation of log of per capita income) declines over the sample period. The relationship between the two ratios estimated through-Fixed Effect Model shows that as trade increases between the groups, per capita income differential decreases. In the context of intra-trade, pre-and post-liberalization periods are also analyzed. The results demonstrates that trade liberalization has caused per capita income to converge. Bilateral convergence approach results demonstrate that bilateral trade ratio does not seem to affect the bilateral income difference significantly in any direction. In some cases, bilateral trade ratio causes income difference to increase insignificantly with smaller coefficient. On the other hand, bilateral trade ratio seems to affect the income difference to shrink insignificantly with minor coefficient. Therefore, bilateral trade convergence approach does not seem to help in reaching the conclusive results. The differences of the outcomes of pre-and post –trade liberalization have been examined through difference approach. Under this approach pre-and post liberalization convergence rates have been analyzed. We used two types of measures of sigma convergence, one where year by year standard deviations of log of real per capita income were computed and the where real per capita income of the source country was taken as deviation from the group mean income, have been applied to capture this difference under this approach. This measures how quickly the source country’s income catches up with the group mean income. The whole sample countries are divided into three groups. Each of three groups has been examined in the context of pre-and post –trade liberalization periods. The first measure shows that in whole sample countries case, per capita income convergence has occurred in both periods. In the cases of Asian economies, convergence occurred only in post liberalization period. The panel data methodology is used with respect to the second measure of sigma convergence and using Fixed Effect Model carries out estimation. The results demonstrate that convergence rate has been accelerated in Asian economies cases. The rate of convergence process has been decelerated over the post-liberalization period in whole sample countries.

The intra group trade increases it causes intra income differential to decrease. This implies those countries that trade more with each other; their income gaps decrease over time. The reduction in per capita income dispersion may be explained due to other factors, but the role of liberalization could not be ignored. Therefore, more attention is needed to human capital, and social capability to gain from the trade. Second, selected countries performed well in terms of per capita income during the liberalization period. The per capita income of the source countries converged more rapidly in the regime of post liberalization as that of pre-liberalization regime. This implies that liberalization policy has helped the countries to grow more rapidly in terms of their per capita income. Therefore, it implies enhanced the convergence rate. Third the study only considers the onset of liberalization and as we could not use the information on the tariff cuts during different periods by the different countries. Last, open trade policies could provide pay off in terms of per capita income growth and its convergence, if the policies carry out with financial, administrative, and institutional controls.

### **References:**

- Abramowitz, M. (1986), 'Catching up, forging ahead, and falling behind', *Journal of Economic History* 385-406
- Baldwin, R.E. (2003), 'Openness and growth: what's the empirical relationship?' *National Bureau of Economic Research, working paper* 9578.
- Baldwin, R.E., Martin, P. and Ottaviano, G. (2001), 'Global income divergence, trade, and industrialization: the geography of growth take-offs', *Journal of Economic Growth* 6, 5-37.
- Barro, R.J., *Macroeconomics*, 1st edition, Wiley, New York, 1984.
- Barro, Robert J. (1991), "Economic Growth in a Cross-Section of Countries," *Quarterly Journal of Economics*, 106, 407-443.
- Barro, Robert J. and Xavier Sala-i-Martin (1991), "Convergence Across States and Regions," *Brookings Papers on Economic Activity*, 107-82.
- Barro, R.J, and Sala-I-Martin. X. (1992), 'convergence'. *Journal of Political Economy*, 100, 223-51.
- Baumol, William J. (1986), "Productivity Growth, Convergence, and Welfare: What The Long-Run Data Show," *American Economic Review*, 76, 1072-85.
- Baumol, William J., Sue Ann B. Blackman and Edward N. Wolff (1989), *Productivity And American Leadership: The Long View*, Cambridge, MA: MIT Press.
- Ben-David, Dan (1993), "Equalizing Exchange: Trade Liberalization and Income Convergence," *Quarterly Journal of Economics*, 108, 653-79.
- Ben-David, Dan (1994a), "Income Disparity among Countries and the Effects of Freer Trade," *Economic Growth and the Structure of Long Run Development*, in Luigi L. Pasinetti and Robert M. Solow (eds), London: Macmillan, 45-64.
- Ben-David, Dan (1994b), "Convergence Clubs and Diverging Economies," CEPR Working Paper No. 922.
- Ben-David, D, (1996c), 'Trade and convergence among countries', *Journal of international Economics* 40,279-98
- Dan Ben-David, and Michael B. Loewy (1998d), 'Free Trade, Growth, and Convergence', *Journal of economic growth*, volume 3, number 2, June 1998.
- Ben-David, D, (2000e), 'Trade growth and disparity among nations', *From Income Disparity and Poverty*, World Trade organization Special Study 5, Geneva: WTO publications, 11-42
- Ben-David, D. and Loewy, M.B (1998f), 'Free trade, growth, and convergence', *Journal of Economic Growth* 3,143-70
- Ben-David, D. and Kimhi A. (2004), 'Trade and the rate of income convergence', *Journal of International Trade & Economic Development*, 13(4), 419-41.
- Black, J. (1970), 'Trade and the natural growth rate', *Oxford Economic Papers* 22(1), 13-23

- Bourguignon, F. and Morrison, C. (2002), 'Inequality among world citizens: 1820-1992', *The American Economic Review* 92,727-44
- Cass, D. (1965), "Optimum Growth in an Aggregative Model of Capital Accumulation," *Review of Economic Studies*, 32, 233-40.
- Corden, W.M. (1971), 'The effects of trade on the rate of growth', In Bhagwati, J.N. et al. (eds) *Trade, Balance of payment And Growth*. Amsterdam: North Holland, 117-43
- De long, B. (1988). 'Productivity Growth, convergence and Welfare: comment', *American Economic Review*, 78, 1138-54.
- Dollar, D. (1992) 'Outward- oriented developing economies really do grow more rapidly: evidence from 95 LDCs, 1976-85', *Economic Development and Cultural change* 40,523-44
- Dollar, D. and Kraay, A. (2001), 'Trade, growth and poverty', Development Research Group, the World Bank.
- Dollar. and Kraay, A. (2003), 'Institutions, trade, and growth', *Journal of Monetary Economics* 50,133-62.
- Dowrick, Steve and Duc-Tho Nguyen (1989), "OECD Comparative Economic Growth 1950-85:Catch-Up and Convergence," *American Economic Review*, 79, 1010-30.
- Easterlin RA (1960), *Interregional Differences in Per Capita Income, Population, and Total Income, 1840-1950 - Trends in the American Economy in the Nineteenth Century*,
- Edwards, S. (1993), 'Openness, trade liberalization, and growth in developing countries', *Journal of Economic Literature* 31,1358-93
- Eicher, T.S. (1999), 'Trade, development and converging growth rates dynamic gains from trade reconsidered', *Journal of International Economics* 48, 179-98
- Elmslie, B.T. (1995), 'Retrospectives: the convergence debate between David Hume and Josiah Tucker', *Journal of Economic Perspectives* 9,207-16
- Frankel, J. and Romer, D. (1999), 'Does trade cause growth?' *The American Economic Review* 89,379-99.
- Frankel, J. and Rose, A. (2002), 'An estimate of the effect of common currencies on trade and income', *The Quarterly Journal of Economics* 117,437-65
- Grossman, G. and Helpman, E. (1991a), *Innovation and Growth in the Global Economy*, Cambridge: The MIT Press.
- Grossman, G. and Helpman, E. (1991b), 'Trade, knowledge spillovers, and growth', *European Economic Review* 35.517-26
- Harrison, A. (1996), 'Openness and growth: a time series, cross-country analysis for developing countries', *Journal of Development Economics* 48,419-47
- Irwin, D. and Tervio, M. (2002), 'Does trade raise income? Evidence from the twentieth century', *Journal of International Economics* 58, 1-18.
- Johnson, H.G. (1967), *International Trade and Economic Growth*, Cambridge, MA: Harvard University Press.
- Koopmans, T. C. (1965), "On the Concept of Optimal Economic Growth," in *The Econometric Approach to Development Planning*, Amsterdam, North-Holland for Pontificia Acad. Sci.
- Kravis B. Irving 1970, 'Trade as a Handmaiden of Growth: similarities between the nineteenth and Twentieth centuries' *The Economic Journal*, Vol. 80, No. 320 (Dec. 1970), pp. 850-872.
- Krueger, A.O. (1980), 'Trade policy as an input to development', *The American Economic Review* 70,288-92.
- Leamer, E. (2000), 'What's the use of factor contents?' *Journal of International Economics* 50,17-50
- Levine, Ross and David Renelt (1992), "A Sensitivity Analysis of Cross-Country Growth Regressions," *American Economic Review*, 82, 942-63.
- Lucas, R.E. Jr. (1988), 'On the mechanics of development planning,' *Journal of*

- Monetary Economics* 22(1), 1-42
- Mankiw, N.G., Romer, D. and Weil, D. (1992), 'A contribution to the empirics of economic growth', *Quarterly Journal of Economics* 107(2),407-37
- Mc Culloch,N.L.and X.Cierea.(2001),'Trade Liberalization and Poverty: A Hand Book', Centre For Economic Policy Research London.
- Meyer(2004), 'Natural And Quasi-Experiments in Economics', National Bureau of Economic Research, Technical Paper No.170
- Mountford, A. (1998), 'Trade, convergence and overtaking', *Journal of International Economics* 46,167-82.
- Nakajima, T. (2003), 'Catch-up in turn in a multi-country international trade model with learning-by-doing and invention', *Journal of development Economics* 72,117-38.
- Oniki, H. and Uzawa, H. (1965), 'Patterns of trade and investment in a dynamic model of international trade', *Review of Economic Studies* 32(1), 15-38.
- Pritchett, L. (1997), 'Divergence, big time', *The Journal of Economic Perspectives* 11, 3-18
- Rassekh, F. (1992), 'the role of international trade in the convergence of per capita GDP in the OECD: 1950-85', *International Economic Journal* 6(4), 1-16.
- Rassekh, F. and Thompson, H. (1993), 'Factor price equalization theorem: theory and evidence', *Journal of Economic Integration* 8(1), 1-32
- Rivera-Batiz, L.A. and Romer, P.M (1991), 'Economic integration and endogenous growth', *Quarterly Journal of Economics*, 106(2), 531-55
- Rodriquez, F. and Rodrik, D, (2001), 'Trade policy and economic growth: a skeptic's guide to the cross-national evidence', In Bernanke, B.S. and Rogoff, K. (eds) NBER *Macroeconomics Annual 2000*. Cambridge: MIT Press, 261-325.
- Rodrik, D, (1996), 'Understanding economic reform policy', *Journal of Economic Literature* 34(1), 9-41.
- Romer, P.M. (1986), 'Increasing returns and long-run growth', *Journal of Political Economy* 94(5), 1002-37.
- Romer, P.M. (1990), 'Endogenous technological change', *Journal of Political Economy*, 98(5), Part II, S71-S102.
- Romer L Batiz, Rivera-P (1991) ' International Trade with Endogenous Technical Change', *European Economic Review*,
- Sachs, J.D. (2003), 'Institutions don't rule: direct effects of geography on per capita income', *National Bureau of Economic Research, Working paper* 9490.
- Sachs, J.D and Warner, A. (1995), 'Economic reform and the process of global integration', *Brookings Papers on Economics Activity* 1, 1-118.
- Slaughter, M.J. (1997), 'Per capita income convergence and the role of international trade', *The American Economic Review* 87(2), 473-85.
- Slaughter, M.J. (2001), 'Trade liberalization and per capita income convergence: a difference-in-difference analysis', *Journal of International Economics* 55(1)203-28
- Solow, R.M. (1956), 'A contribution to the theory of economic growth', *Quarterly Journal of Economics* 70(1), 65-94.
- Spilimbergo, A. (2000), 'Growth and trade: the north can lose', *Journal of Economic Growth* 5,131-46.
- Srinivasan, T.N. (1999), 'Trade orientation, trade liberalization, and economic growth'. In Saxonhouse, G.R. and Srinivasan, T.N.(eds) *Development, Duality, and the International Economic Regime*. Ann Arbor: The University of Michigan Press, 155-96
- Stokey, N.L. (1991), 'Technological transfer by multinational firms: the resources cost of transferring technological know0how', *Economic Journal* 87,242-61.
- Temple, J. (1999), 'The new growth evidence', *Journal of Economic Literature* 37,112-56.
- Swan, TW (1956), 'Economic Growth and Capital Accumulation', *Economic Record*,
- Theo Eicher, S Turnovsky (1999), 'A Generalized Model of Economic Growth',



*Economic Journal*

- Temple, J. and Johnson, P.A. (1998), 'Social capability and economic growth', *Quarterly Journal of Economics*. 113, August, 965-90.
- Vamvakidis, A. (2002), 'How robust is the growth-openness connection? Historical evidence', *Journal of Economic Growth* 7(1), 57-80.
- Williamson, J.G. (1991) Economic Convergence: Placing Post-Famine Ireland in Comparative Perspective, Harvard Institute of Economic Research Working Papers with number 1654.
- Walz, U. (1998), 'Does an enlargement of a common market stimulate growth and convergence?' *Journal of International Economics* 45,297-321.
- Young A. (1991), 'Learning by doing and the dynamic effects of international trade', *Quarterly Journal of Economics* 106,369-405.