

## **Accelerating and Growth Effects of Trade Openness across OIC Countries**

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Accelerating and growth effect of trade openness are controversial subjects that has been subjected to a whole literature. This paper investigates whether trade openness accelerates income per capita convergence process across OIC countries. For this purpose, we used convergence-growth equation that include three trade openness measures i.e. intra-trade openness, extra(outside)-trade openness and overall trade openness and dynamic GMM-SYS panel data estimator. We find that growth effect of trade openness varies by different openness proxies and by income groups. Coefficients of openness proxies show that growth effect of extra (outside)-trade openness is greater than intra- trade openness. Our results also show that overall openness trade and intra-openness trade proxies have dampened GDP per capita convergence process. But, extra (outside)-trade openness has accelerated this process.

### **1. Introduction**

One of the oldest controversies facing economists on economic growth issues is income convergence. Income convergence is one of the outcomes of Solow (1956) neoclassical growth model. This model is based on five basic assumptions, i.e. exogenous technology and saving rates, homogenous labor, diminishing return for factors, perfect competition, and closed economy. In neoclassical growth theory, the main endogenous source of output growth is capital accumulation. In this model, the substitution possibility and diminishing return force the economy to converge to the equilibrium capital and income level (Islam, 2003, p: 313).

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Solow model predicts that given the saving, population growth, and technology rates, economies will converge to unique equilibrium if the parameters be same across them, and will converge to separate equilibrium levels if the parameters be different across them. The former and latter are named absolute convergence and conditional convergence, respectively. Another concept of income convergence is sigma convergence that was associated the disparity of per capita income across a group of countries or regions.

Two main questions exist on income convergence debate. First, are countries converging to same (or different) steady state(s)? In other word, are income gaps decreasing across countries? Second, which factors cause and accelerate per capita income convergence process?

For answer to first question, economists use different ways, e.g.  $\beta$ -convergence, sigma convergence, club convergence, stochastic convergence, and so on. A large body of empirical researches on income convergence has focused on first question. One of the most robust empirical results on first question is, despite, the countries converge to themselves steady-states (conditional convergence), but, income gaps are increasing across countries. In other word, differences in per capita income initial values are smaller than differences in country-specific steady state values (see Durlauf et al (2005), and Grier et al (2007)).

For answer to second question, economists believe that observed convergence in income per capita may be the results of three different mechanisms: convergence due to capital accumulation, convergence due to technology transfer and convergence due to a combination of both. But, economists do not able to discriminate between these three hypotheses. In the theoretical and empirical studies, some factors have identified that can affect on income convergence process. One of the factors is international trade<sup>3</sup> that have attracted the attention of some economists and produced a massive literature. In the theoretical literature, international trade can affects income per capita convergence process through factor price, factor accumulation, and technology spillovers and the effect can be positive or negative. Factor price equalization theorem (FPE) by Samuelson (1948) provides a theoretical framework for the effect of international trade on the equalization of

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<sup>3</sup> Another factor is financial development. See Aghion et al (2005)

income of identical factors across economies. Rassekh and Tompson(1993) has named it micro convergence.

Baldwin et al (2001), Baldwin (2002) and Nakajima (2003) show that divergence and convergence processes may occur at different stage of trade liberalization or among different groups of countries. For example, Baldwin (2002) show that according to the Stolper - Samuelson theorem, trade through raising (reducing) wages in poor (rich) countries lead to income convergence and through reducing (raising) capital return lead to divergence income. Young (1991) show that trade cause poor countries specialized in sectors with little potential for technology growth and scale economies and may fall in to poverty trap. Prebisch (1950) argue that permanent decreases in the international prices of raw materials and primary commodities would lead to more profound differences between developed and developing countries. Helpman (1999, p: 25) notes that international trade is major carriers of substantial international spillovers associated with investment in research and development and facilitates the exchange of intangible ideas. Sloughter (2001) by difference – in – difference method finds that various post-1945 trade liberalization policies lead to income divergence. Parikh and Shibata (2004) have examined the effect of trade liberalization on income convergence in developing countries. The results of their study show trade liberalization has accelerated income per capita across Asian and Latin American countries and has diverged income per capita across African countries.

As see above, the growth and accelerating effects of international trade has been as a controversial debates because: i) findings from theoretical models and empirical investigations show no determinate linkage from trade to income convergence. ii) Various trade policies that have been implemented across countries have led to different outcomes. iii) As a whole, as has been mentioned by Giles and Stroomer (2006, P: 885-886) "the results on these debates have been mixed, depending upon the definition of convergence that is adopted the choice of statistical techniques, the type of data, the time period in question, and the level of development of countries under consideration". Hence, the relationship between trade and income convergence becomes an empirical question. In this paper, we are going to examine the growth and acceleration effects of international trade across the organization of Islamic

Conference (OIC hereafter) countries. OIC countries include 57 developing countries that the more of them have specialized in exporting primary and fuels products. According to existing data, fuel and non-fuel primary commodities account for more than 50 percent of merchandise export's 40 of 52 OIC members.

According to literature, specialization in exporting primary products is harmful for economic performance (see Prebisch (1950), Sachs and Warner (1997), Dowrick and Golley (2004)). Hence, in this paper, we will attempt that compare the accelerating and growth effects of inter-group trade (trade relationship OIC members with another OIC members) (INTRA hereafter) and rest-group trade (trade relationship OIC members with rest OIC members) (REST hereafter) across OIC countries.

The remainder of paper is set out as follows. Section 2 briefly gives an economic overview of the OIC countries. Section 3 describes the data, their source and our chosen methodology to estimation model. Section 4 presents the empirical results. Section 5 concludes.

## **2. OIC Countries: An Economic Overview**

The OIC as group set up in 1969 and includes 57 Islamic countries in 2009. It have dispersed over a large geographical region, i.e. the Middle East and North Africa, West, and southern Africa, central Asia, Southeast Asia, the Indian Sub continent and South America.

The countries have one common denominator among, Islam, but they are a diverse group of countries encompassing remarkable differences in geography, history, language, political system, and culture (Ghani, 2007, P: 41).

Despite, OIC countries account for one sixth of the world land area and more than one fifth of its population, but, their share of world GDP and merchandise export in term of current US dollars is 6.6% and 9.8% respectively (OIC economic performance and human development, 2008, PP: 1-2).

22 OIC member countries are considered as developing countries that more than 50 percent of the exports are non-oil primary commodities,

mostly agricultural commodities. On the other hand, 17 OIC countries are classified as fuel – exporting countries, e.g. Iran, Saudi Arabia, and...<sup>4</sup> Therefore, the prospect of growth and the development of these countries are dependent on producing and exporting of only primary goods oil or gas. According to the recent World Bank classification, 22 OIC member countries are considered as heavily indebted poor countries, potentially eligible to receive debt relief. Kuran (2004) has believed that the decline in Muslim countries' economic development started since the 18<sup>th</sup> century. Ghani (2007, p: 42) has believed that in order to explain this decline, any one need to examine the political systems of absolute central authority, tribalism and guilds, institutional and governance quality, incidence of conflicts , and the discrimination to seek innovation during the period.

### **3. Data, Variables, and Econometric Methodology**

#### **3.1. Data and sample**

The data for this study have been taken from OIC countries web site. Originally 57 OIC countries was selected but after screening process, 37 countries were chosen for which data on most of the variable were available for at least 25 years, i.e. 1980-2004.

We focus on non-overlapping 5-year average for each country as our unit of observation, so we obtain a total of five panels over the 1980-2004.

#### **3.2. Variables**

In order to analyze the effect of international trade openness on economic growth and convergence process, we use a proxy for openness trade. We also use physical investment (as a share of GDP), a proxy for human capital, population growth, and the log of GDP per capita and capital per capita in the first year of the any sub period as control variables.

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<sup>4</sup> One quarter of the World's known crude-oil reserves are located in Saudi Arabia. Iran has 15% of the world's total of natural gas reserves. Algeria, Morocco, Tunisia, Jordan, and the Syrian account for about one third of the world's phosphate production and Morocco itself has more than 30% of the phosphate rock and 40% of its phosphate acid trade. Iran and Jordan have potash, Egypt, Syria, and Iran have respectively cotton, tobacco, iron, coal, and ammonia. (Guetat and Serranito, 2007)

In order to capture different channels that openness trade affects on economic growth, we used three openness proxies. The first one is the ratio to GDP of trade, i.e. export plus import to GDP (open hereafter). The second indicator that measures the trade within OIC countries is export to OIC countries plus import from OIC countries to GDP (intra open hereafter) and the third indicator that measures the trade of OIC countries with rest countries group is export to rest OIC countries group plus import from rest OIC countries group (rest open hereafter).

Human capital has been proxied by Secondary School Enrolment. Human capital affects on economic growth through two channels: the domestic innovation component and the technology diffusion component, which directly enhance a country's ability to innovate and indirectly through technology adoption, i.e. to foster technology “catch-up” with the leading country (Engelbrecht, 2003: 40). Hence, we expect it to be positively correlated with economic growth.

The log of GDP per capita in the first year of the any sub period captures the advantage of backwardness, emphasized by Abramowitz (1986). A negative  $\mu_y$  is interpreted as supported for the convergence hypothesis because it would mean that after controlling for variable that influence growth, those with lower income per capita have grown faster over the sample period.

### 3.3. Model specification

In order to examine growth effect of openness trade, we have specified following equation:

$$gy_{i,t} = \eta_i + \xi + \mu_y \ln(y_{i,t-5}) + \gamma_y openness_{i,t} + \theta_y X_{i,t} + ILLD_i + \varepsilon_{i,t} \quad (1)$$

Where  $gy_{i,t}$  is GDP per capita growth in country  $i$  in period  $t$ ,  $X_{i,t}$  is a row vector of determination of economic growth or control variables.  $\eta_i$ ,  $\xi_{i,t}$  and  $\varepsilon_{i,t}$  are country specific effect, period specific effect, and error term.  $\ln(y_{i,t-5})$  is the log of GDP per capita in the first year of the any sub period.  $ILLD_i$  is income level dummy variables. According to World Bank (2008) classification, we have classified our sample to four

groups' i.e. high income (high, hereafter), upper-middle income (upmid, hereafter), lower-middle income (lowmid, hereafter), and low income countries. For example, for high income group,  $ILD_i=1$  and zero for other groups.

In order to find out whether openness trade is convergence factor, we have used two models. First model is following:

$$gy_{i,t} = \eta_t + \xi_t + \mu_y \ln(y_{i,t-s}) + \gamma_y openness_{i,t} + \gamma(openness_{i,t} * ILD) + \theta_y X_{i,t} + ILD_i + v_{i,t} \quad (2)$$

According to equation (2), when international openness is converging factor that  $\gamma$  be greater for low income countries than high income group.

Another model that has been used in this paper is as following:

$$gy_{i,t} = \eta_t + \xi_t + \mu_y \ln(y_{i,t-s}) + \gamma_y openness_{i,t} + \delta[openness_{i,t} * \ln(y_{i,t-s})] + \theta_y X_{i,t} + ILD_i + v_{i,t} \quad (3)$$

In equation (3), we added interaction term  $-[openness_{i,t} * \ln(y_{i,t-s})]$  in equation (1). Accelerating effect of openness trade is represented by the interaction term which captures the effect of the openness trade on convergence process:

$$\beta_i = \frac{\partial Gy_{i,t}}{\partial \ln(y_{i,t-s})} = \mu_y + \delta openness_{i,t} \quad \text{where, } Gy_{i,t} = \frac{1}{5} [\ln(y_{i,t}) - \ln(y_{i,t-s})] \quad (4)$$

As equation (4) shows, country-specific convergence parameters depend on trade openness. Trade openness accelerates convergence process if only if  $\delta < 0$ .

### 3.4. Econometric methodology

In empirical investigation, in order to estimation of above equations, cross section and panel data approaches are used.

Islam (1995) and Caselli et al (1996) argued that using the pure cross-section analyses for estimating above equations give inconsistent results because two sources of inconsistency: omitted variable or correlated individual effects and endogenous explanatory variables. Following Caselli, et al. (1996), employing a GMM procedure eliminates the inconsistencies by taking first differences in the dynamic model and instrumenting all the right-hand side variables. In the first-differenced equations using lagged levels under the assumption that the time-varying disturbances in the original levels equations are not serially correlated. In the empirical work on cross-country growth, two kinds of GMM panel estimator namely first-differenced and system-GMM are employed. Arrelano & Bound (1991) proposed first-differenced GMM estimator and used lags of dependent variables as instrumental variables. But Blundell and Bound (1998) and Bound et al. (1995) showed that the lags of the level are weak instrument when the regression equation is in difference. For example, Bound, et al. (1995) say "When the individual series have near unit root properties, the instruments available for the equations in first-difference are likely to be weak instrument variable estimator can be subject to serious finite sample biases where the instrument used are weak. To solve the problem, Blundell & Bound (1998) proposed GMM-system estimator which combines in a system the regression in differences with the regression in levels. The result of their simulation shows that when the coefficient on the lagged dependent variable is close to 1, the efficiency of using the GMM-System estimator is greatly improved. The consistency of GMM estimator depends on the assumptions about the validity of the instrument and error term. Therefore, we use two kinds of test: instruments validity test and no-serial correlation in error term test. To test instrument validity, we use Sargan test. The null hypothesis of the Sargan test is as follows:

$H_0$  : Over – identifying restrictions are valid.

For the first and second order serial correlation of the differenced residuals, we use  $m_j$  Statistic where j is the order of autocorrelation.

This statistic has an asymptotically normal distribution  $N(0, 1)$ .



#### 4. Results

In order to investigate of growth effect of international trade, we have estimated model (1). The results have been presented in table (1). As see, in all cases, all variables, except dummy variables, are treated as endogenous and their lags levels are used as instruments for the level and difference equations. The results of dynamic GMM panel tests, i.e. Sargan and serial correlation tests respectively, show that: i) the validity of instruments is satisfied and ii) the second serial correlation problem has been rejected.

The coefficient of initial GDP per capita show that conditional convergence hypothesis across OIC countries is accepted. Assuming *ceteris paribus*, it takes 12 year for at least 50 percent of the gap between current GDP per capita level and its steady state to be eliminated. This show that OIC countries lay around own steady states but this level is different across them.

Other results show that openness trade, physical capital and human capital have positive effect on growth whereas, population growth has negative effect. Comparison of openness trade proxies coefficients show all of them have positive effect on GDP per capita growth but, that growth effect of open and rest open is greater than intra open. One possible explanation is that the trade within OIC countries (intra trade) contains more primary goods than open and rest open.

In order to examination of accelerating effect of openness trade, we have estimated model (2) and (3) that details of results have been summarized in table 2 and 3 respectively.

As seen in table 2, the accelerating effect of open, intra open is greater for high income and upmid income countries group. This effect for rest open is greater for high and lowmid income countries groups.

In order to show that our results are robust, we estimated model (3). The results have been presented in table 3. As seen in the table, coefficients of interact terms of (open\* LY) and (intra open\* LY) are positive that show these variables i.e. open and intra open have reduced GDP per capita convergence process, but, coefficient of interact term of (rest open\*LY) is negative that show this variable accelerate GDP per capita

convergence process. In other word, growth effects of an increase in open and intra open depend positively on the initial level development and growth effect of an increase in rest open depend negatively on the initial level development.

## 5. Concluding

The literature on the trade and growth relationship shows that it is ambiguous. Besides, as has mentioned in literature, convergence-accelerating effect of international trade in theoretical models and empirical investigations show no determinate linkage. But, one of the robustness results on latter is that international trade has promoted income per capita convergence process across countries until 1980, but, since 1980, has dampened this process(see dowrick & Golley(2004), Rassekh(2007), Delong & Dowrick(2003)).

In this paper, we have examined growth and accelerating effects of international trade among OIC countries that most of them have specialized in fuel and primary goods. For this purpose, we have used convergence-growth equation, GMM-SYS estimator developed for dynamic models of panel data that were introduced by Blundell and Bond(1998), and three proxies for openness trade variables, namely open(exports plus imports to GDP), intra open(exports to OIC countries plus imports from OIC countries to GDP), and rest open(exports to rest countries OIC group plus imports from rest OIC countries group). Our empirical work finds that: i) trade openness is associated with faster growth in generally, but, more importantly, that this effect varies by different openness proxies and by income groups. Our findings on coefficients of openness proxies show that growth effect of rest open is greater than intra open. This result show that trade of primary and fuel products was less beneficial for growth. Coefficients on openness proxies at different income groups show that trade openness has been harmful for the growth performance of the low income countries group. In contrast, other income groups have benefited trade openness. Upper – middle income countries group among other income groups have attracted most benefits of intra and rest trade openness. ii) Open and intra open variables have dampened GDP per capita convergence process. But, rest open has accelerated this process. Our findings show despite open and intra open variables have prevented convergence

process, but none of them have not diverged GDP per capita of OIC countries than their steady state levels.

**Table1. Panel estimates of the growth equation (1)**

Variables	Trade Openness proxies		
	open	Intra open	Rest open
Initial GDP per capita (in logs)	-0.05*	-0.04*	-0.06*
Investment (%GDP, in logs)	0.02*	0.03*	0.05*
Human capital investment (in logs)	0.003***	-0.004	0.02*
Population growth (in logs)	-0.02*	-0.03*	0.003
Openness variables			
Trade openness proxies (in logs)	0.018*	0.008**	0.016*
Period shifts			
1985-1989 period shift	0.05*	-0.03***	0.03**
1990-1994 period shift	0.05*	-0.03***	0.03*
1995-1999 period shift	0.06*	-0.02	0.04**
2000-2004 period shift	0.07*	-0.005	0.06*
Income level dummies			
high	0.12*	0.15*	0.12*
upmid	0.03	0.05*	0.03***
lowmid	-0.004	0.03***	-0.02**
constant	0.2*	0.2***	0.3*
Countries/observations	37/157	37/157	37/155
Specification tests(p-values)			
First. order serial correlation test	0.02	0.003	0.03
Second. order serial correlation test	0.8	0.3	0.7
Sargan test	0.8	0.7	0.7

1) Dependent variable: average of Growth rate of real GDP per capita.

2) Cross-country panel data consisting of non-overlapping five-year averages spanning 1980-2004.

3) \*, \*\*, and \*\*\* denotes statistical significance at the 1, 5, and 10 percent level respectively.

4) Estimation method: GMM-SYS estimator (Arellano and Bover, 1995; Blundell and Bond, 1998).

5) In all regressions, we treat right-hand variables (except period shifts and income level dummies variables) as endogenous in all regressions and instrument them using from lags t-3 and t-2 in the first-differenced and t-1 and t-2 in the level equations.

6) Source: Author's calculations.

**Table2. Panel estimates of the growth equation (2)**

Variables	Trade Openness proxies		
	open	Intra open	Rest open
Initial GDP per capita (in logs)	-0.01*	-0.15*	-0.1*
Investment (%GDP, in logs)	0.04*	0.04*	0.03*
Human capital investment (in logs)	0.005	0.01***	0.03
Population growth (in logs)	-0.01	-0.02***	0.01
Openness variables			
Trade openness proxies (in logs)	-0.03*	-0.03*	-0.04*
Interaction term			
Openness proxies* high	0.2*	-0.01	0.06*
Openness proxies* upmiddle	0.1**	0.09*	0.1*
Openness proxies* middle	0.03*	0.03*	0.06*
Period shifts			
1985-1989 period shift	0.04*	-0.04	0.05**
1990-1994 period shift	0.04*	-0.03	0.05**
1995-1999 period shift	0.05*	-0.01	0.06*
2000-2004 period shift	0.06*	-0.004	0.08*
Income level dummies			
high	-0.8*	0.5*	0.02
upmid	-0.3*	-0.01	-0.3*
lowmid	-0.1*	0.07***	-0.2**
constant	0.1*	0.9*	0.8*
Countries/observations	37/157	37/157	37/155
Specification tests(p-values)			
First. order serial correlation test	0.01	0.02	0.06
Second. order serial correlation test	0.3	0.1	0.4
Sargan test	0.15	0.4	0.12

1) Dependent variable: average of Growth rate of real GDP per capita.

2) Cross-country panel data consisting of non-overlapping five-year averages spanning 1980-2004.

3) \*, \*\*, and \*\*\* denotes statistical significance at the 1, 5, and 10 percent level respectively.

4) Estimation method: GMM-SYS estimator (Arellano and Bover, 1995; Blundell and Bond, 1998).

5) In all regressions, we treat right-hand variables (except period shifts and income level dummies variables) as endogenous in all regressions and instrument them using from lags t-3 and t-2 in the first-differenced and t-1, t-2, and t-3 in the level equations.

6) Source: Author's calculations.

**Table3. Panel estimates of the growth equation (3)**

Variables	Trade Openness proxies		
	open	Intra open	Rest open
Initial GDP per capita (in logs)	-0.14*	-0.05*	0.07*
Investment (%GDP, in logs)	0.02*	0.04*	0.06*
Human capital investment (in logs)	0.01***	0.001	-0.001
Population growth (in logs)	-0.02***	-0.03*	0.01
Openness variables			
Trade openness proxies (in logs)	-0.07***	-0.04**	0.2*
Interaction term			
openness proxies* Initial GDP per capita	0.01**	0.008**	-0.03*
Period shifts			
1985-1989 period shift	0.04**	-0.01	0.01
1990-1994 period shift	0.05*	-0.01	0.02
1995-1999 period shift	0.05*	-0.002	0.04**
2000-2004 period shift	0.06*	0.005	0.05*
Income level dummies			
high	0.2*	0.09*	0.2*
upmid	0.03	0.04**	0.04*
lowmid	0.04**	0.008	0.02
constant	0.8*	0.2*	-0.7*
Countries/observations	37/157	37/157	37/155
Specification tests(p-values)			
First. order serial correlation test	0.01	0.002	0.01
Second. order serial correlation test	0.3	0.3	0.7
Sargan test	0.9	0.98	0.7

1) Dependent variable: average of Growth rate of real GDP per capita.

2) Cross-country panel data consisting of non-overlapping five-year averages spanning 1980-2004.

3) \*, \*\*, and \*\*\* denotes statistical significance at the 1, 5, and 10 percent level respectively.

4) Estimation method: GMM-SYS estimator (Arellano and Bover, 1995; Blundell and Bond, 1998).

5) In all regressions, we treat right-hand variables (except period shifts and income level dummies variables) as endogenous in all regressions and instrument them using from lags t-3 and t-2 in the first-differenced and t-2 in the level equations.

6) Source: Author's calculations.

## Reference

Abramovitz, M. (1986), "Catching Up, Forging Ahead, and Falling Behind," *Journal of Economic History*, 46, 385-406.

Aghion, P, Howit, P, and D, Foulkes. (2005), "the Effect of Financial Development on Convergence: Theory and Evidence," *the Quarterly Journal of Economics*, February, 173-222

Arellano, M., and Bond, S. R. (1991), "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations," *Review of Economic Studies*, 58, 277–297

Baldwin, R., 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.

Baldwin, R. (1992), "Measurable Dynamic Gains from Trade", *Journal of Political Economy*, 100, 162-174.

Blundell, R. W. and Bond, S. R. (1998), "Initial Conditions and Moment Restrictions in Dynamic Panel Data Models," *Journal of Econometrics*, 87, 115–143.

Bound, J., Jager, D. A., and Baker, R. M. (1995), "Problem with Instrumental Variable Estimation When the Correlation between the Instruments and the Endogenous Explanatory Variable is Weak", *Journal of the American Statistical Association*," 90, 443-450

Caselli, F., Esquivel, G. and Lefort, F. (1996), "Reopening the Convergence Debate: a New Look at Cross-Country Growth Empirics," *Journal of Economic Growth*, 1, 363-389.

Dowrick, S. and Golley, J. (2004), "Trade Openness and Growth: Who Benefits?", *Oxford Review of Policy*, 20, 38-56.

Durlauf, S., Johnson, P., and Temple, J. (2005), Growth Econometrics, in P. Aghion and S. Durlauf, (28 eds), *Handbook of Economic Growth*, Amsterdam, North-Holland, 555-677.

Engelbercht, Hans-Jurgan, (2003)," Human Capital and Economic Growth: Cross-Section Evidence for OECD Countries," *The Economic Record*, 79, 40–51

Ghani, Gairuzazmi, M, (2007), "Does OIC membership reduced trade?" *Journal of Economic Cooperation and development*, 28(4), 39-62.

Giles, D. E. A. and Stroomer, C. N. (2006), "Does Trade Openness Affect the Speed of Output Convergence? Some Empirical Evidence", *Empirical Economics*, 31, 883-903.

Helpman, E. (1999), "R&D and Productivity: The International Connection", in A. Razin and E. Sadka (eds), *The Economics of Globalization: Policy Perspectives from Public Economics*, New York: Cambridge University Press.

Islam, N. (1995), "Growth Empirics: A Panel Data Approach," *The Quarterly Journal of Economics*, 110(4):1127-70.

Islam, N. (2003b)," What Have We Learnt from the Convergence Debate?" *Journal of Economic Surveys*, 17, 309-362.

Kuran, T. (2004), "Islam and mammon: the economic predicaments of Islamism," Princeton, NJ, Princeton university press.

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, 117-138.

Parikh, A, and Miyuki, S. (2004)," Does Trade Liberalization Accelerate Convergence in Per Capita Incomes in Developing Countries?" *Journal of Asian Economics*, 15, 33-48

Prebisch, R. (1950), "The Economic Development of Latin America and its Principal Problems", *United Nations: New York*.

Rassekh, F. and Tompson, H. (1993), "Micro Convergence and Macro Convergence", *Pacific Economic Review*, 3, 3-13.

Sachs, J and Andrew, W. (1995)," Economic Reform and the Process of Global Integration," *Brookings Papers on Economics Activity*, 1, 1–118.

Samuelson, P. (1948), "International Trade and the Equalization of Factor Prices", *Economic Journal*, 58, 163-184.

Slaughter, M.J. (2001), "Trade Liberalization and Per Capita Income Convergence: A Difference-in-Differences Analysis", *Journal of International Economics*, 55, 203- 228.

Solow, R. M. (1956), "A Contribution to the Theory of Economic Growth", *Quarterly Journal of Economics*, 70, 65-94.

Young, A. (1991), "Learning by Doing and the Dynamic Effects of International Trade", *Quarterly Journal of Economics*, 106, 369-405.