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Income Convergence or Income Divergence? A Study on Selected OIC Countries

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In this paper, the existence of income convergence or income divergence is investigated on ten selected OIC (the Organisation of Islamic Conference) economies. The results are then linked to the degree of openness of the countries using globalization indices. In order to investigate the existence of either income convergence or divergence between selected Islamic countries, income differentials between selected OIC countries and the benchmark country are computed and a series of test is done. The tests include stationary linearity test using Augmented Dickey-Fuller (ADF) test for linear time-series and non-linear stationary test using Kapetanois et al. (KSS) tests for non-linear time series. The study finds that most of the countries experience income divergence except for three countries. By analyzing the degree of globalization in these economies, it is found that the results support the endogenous theory and depending approach which predict that globalization is likely to cause income divergence (inequality) rather than convergence (equality).

1. Introduction

It is hypothesized that despite the difference in initial income of countries/economies, poorer and richer economies may eventually converge in term of economic growth. This refers to income convergence. In specific, income convergence refers to the narrowing of income differential among poor and richer economies.

The issue of income convergence has drawn the attention of many empirical researchers and policy-makers. Most of the studies on this

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issue were done on developed and developing economies, such as among Western European economies by Salimano (2001) and on East Asian economies by Liew and Lim (2005) and Liew and Ahmad (2006).

The empirical evidence on the issue of income convergence is mixed, depending upon model characteristics, underlying assumptions, and the nature of data (either cross section or time series). Generally, studies using cross-section data provide evidence in support of the convergence hypothesis across nations such as studies by Baumol (1986), Barro and Sala-I-Martin (1991, 1992, 1995), Mankiw, Romer and Weil (1992), Taylor (1999), Rahman (2006) and others. In specific, using Madison's data covering the period 1870-1979, Baumol (1986) tested the convergence among 16 industrialized countries. He regressed output growth on a constant and an initial income that ended up with very strong evidence of convergence. Barro and Sala-I-Martin (1992, 1995), in their significant empirical studies based on the cross section approach of convergence, found evidence in favor of convergence. The test of convergence was done across different states of the United States, the prefectures of Japan and across the regions of eight European countries. They found evidence of absolute β-convergence is the norm for these regional economies. Taylor (1999) also found convergence pattern in sample of a group of seven countries in an alternative setting of neoclassical model termed as 'open-economy factor accumulation model' that allows capital and labor migration. Meanwhile, Mankiw et al. (1992) found evidence of conditional convergence in the sense that such convergence is evident for all sample groups when they controlled for investment, growth of the working age population, and school enrollment.

On the other hand, studies which use time series data mostly do not support income convergence (Quah ,1992; Bernard and Durlauf, 1995; Alvi and Rahman, 2005). Bernard and Durlauf (1995), for example, using Johansen's co-integration method to test the convergence of per capita income across 15 OECD countries. They argue that cross-sectional convergence is a weaker notion because such tests tend to spuriously reject the non-convergence hypothesis when economies have different long run steady states. Unlike the findings of cross-section studies, their investigation fails to reject the null hypothesis of no convergence across 15 OECD countries. However, they do find

evidence of substantial cointegration indicating the presence of some common long-run factors that jointly determine output growth. A study by Alvi and Rahman (2005) which examines income convergence across U.S. regions for the period 1929-2002 using unit root and cointegration techniques also suggests non-convergence in per capita incomes across U.S. regions even when endogenous breakpoints are included. They find evidence of cointegration among technology and incomes in the leading regions, but not in the lagging ones, identifying technology as a factor that contributes to the lack of convergence.

Nevertheless, very few studies is done extensively on Muslims economies in particular the member of the OIC (the Organisation of Islamic Conference) on the issue of income convergence and in particular, related to globalization. This is basically because Muslim economies tended to be more close off to the outside world in the past due to various cultural reasons. But, the impact of the current globalization on the Muslim world has been tremendous, with negative and positive outcomes for different nations in terms of transfer of goods, people, information and technology. Thus, it would be intriguing to see how globalization would affect the income convergence/divergence of those economies which motivates the conduct of the present study.

In the past, studies on income convergence of Muslim economies had also produced mixed results. For example, a study by Rahman and Hossain (n.d.) on Bangladesh which examines per capita income convergence across six divisions - Dhaka, Chittagong, Rajshahi, Khulna, Sylhet, and Barisal using annual data covering 1977 - 2000 does not provide enough evidence in favor of the convergence hypothesis even though the regions have similar socio-economic background, physical infrastructure, and access to the same financial system, administrative institutions, and technology. Another study by Sameti, Farahmand and Koleyni (n.d.) examines income convergence between 22 MENA countries (Afghanistan - Algeria - Bahrain - Cyprus - Egypt - Iran - Iraq - Israel - Jordan - Kuwait - Mauritania - Morocco - Oman - Pakistan - Qatar - Saudia Arabia - Somalia - Sudan - Syria - Tunisia - Turkey - United Arab Emirates) during the period of 1970-2003 by using the neoclassical growth model of Barro - Salla - i - Martin. Non - linearity of the underlying relationships, the restrictiveness of assumptions of functional forms and econometric problems in the estimation and

application of theoretical models advocate for the use of Artificial Neural Networks (ANN) algorithms in this study. They show that by changing the quantitative tools of analysis and using ANN, the results become more precise and show that absolute convergence and conditional convergence are significant but the rate of convergence is low. It means that their analysis supports tendency of poor economies to grow faster than rich ones across the MENA countries. Similar method also used by Koleyni (2009) to test income convergence between 177 world countries(inclusive Muslim countries) during the period of 1980-200, that is, using the neoclassical growth model of Barro-Sala-i-Martin for both kinds of convergence (absolute and conditional). Due to non-linearity of the underlying relationships, the restrictiveness of assumptions of functional forms and econometric problems in the estimation and application of theoretical models, the study also uses Artificial Neural Networks (ANN) algorithms. Results show that absolute convergence does not exist and conditional convergence is insignificant. A study on Malaysia and Indonesia as Muslim countries in ASEAN was done by Ismail (2008) on the issue of income convergence. This study investigates the issues of convergence and economic growth in the ASEAN. Preliminary graphical observations find strong evidence of β and σ convergence after the expansion of ASEAN membership. This results support the convergence theory that poor countries in ASEAN do catch up with the rich ones. The convergence and growth effects in the ASEAN integration is estimated by using the dynamic heterogenous panel approach namely Pooled Mean Group Estimator (PMGE). The empirical evidence supports unconditional and conditional convergence hypotheses in the ASEAN5 namely Indonesia, Malaysia, Singapore, The Philippnes and Thailand, for the 1960-2004 period. The ASEAN5 tends to converge to a steady state growth rate of per capita GDP with a speed of convergence of between 1.6% and 16.6%. These mixed results obtained from previous studies of Muslim countries also motivate us to conduct further studies on this issue.

On similar issue, there are studies attempt to adopt various econometric approaches or methods, linear or non-linear, to test the income convergence hypothesis. Among many studies, are Coulombe and Tremblay (2001), Afxentiou and Apostolos (1998), Coulombe and Lee (1998), Hofer and Worgotter (1997), Petrakos and Saratsis(2000) and Barro and Sala-i-Martin (1992).

The validity of this hypothesis of income convergence could also be tested using stationary test of time series of income differential between poorer and richer countries. If there is evidence of stationarity (stable long-run movement) between two countries' incomes, this implies income convergence over time. Otherwise, the result would be interpreted as income divergence. One commonly employed stationary test is the augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1979). The empirical evidence based on the ADF test in most studies is generally in favour of income divergence. Some authors, including Li and Papell (1999), however, demonstrated that the ADF test is biased towards the non-rejection of stationary and therefore producing results that favour income divergence. In fact, in their study on the OECD economies, Li and Papell(1999), among others, able to provide more evidence of convergence after taking into consideration the structural breaks in their proposed stationary tests. Nonetheless, studies by Liew and Lim (2005) and Liew and Ahmad (2006) took a step further by looking the issue of convergence from non-linear point of view. Motivated by the findings of Liew et al. (2003) who argue that linear testing procedure may fail in non-linear context, Liew and Lim (2005) and Liew and Ahmad (2006) show empirically that non-linear stationary tests of Kapetonis et al. (2003) perform better than ADF in detecting stationarity in the presence of non-linearity.

Based on the fact that literature on Muslim developing countries on this issue is still scanty and particularly, non-linear approach adopted on studies on these economies is rare, this present study aims to investigate the existence of income convergence or divergence of selected Muslim countries (members of the OIC) using this latest method of non-linear test of stationary to produce robust results. Furthermore, motivated by mixed arguments on the relationship between income convergence/divergence and globalization in literature, the study attempts to relate the existence of convergence/divergence in these economies to openness of the economies (globalization). It is expected that the analysis on this relationship will, more or less, assist in setting up policy recommendation in these economies on reducing income gap and help to answer a question whether globalization policy is a better way to reduce the gap.

This study is organized as follows. Following the introduction in section 1, Section 2 reviews data and empirical work. Section 3 presents the empirical results. Section 4 attempts to relate the convergence/divergence of income of the countries in study to globalization and Section 5 concludes.

2. Data and Empirical Work

Sample period of this study covers 1970 to 2004 on 10 selected OIC members namely, Burkina Faso, Benin, Egypt, Malaysia, Oman, Bangladesh, Indonesia, Iran, Nigeria and Saudi Arabia. Unlike previous studies which mostly using sample countries base on regional group (MENA countries, ASEAN members and others), this study will select sample countries from various continents. The sample period is chosen based on the availability of data for all economies in study. To do a measurement of convergence/divergence, a neo-classical approach to convergence is used here based on the simple idea that convergence implies that poor countries grow faster than rich countries in terms of their per capita income. Note that empirical testing of the convergence hypothesis provides several definitions of convergence, and thus different methodologies to test it Islam (2003) provides a survey on the different definitions and methodologies relative to the concept of convergence. In the convergence debate, two definitions have emerged: the absolute convergence and the conditional convergence. The former occurs when the level of per capita income of the poor countries catch-up with the one of the rich ones. This can be achieved if the growth rates of developing countries are significantly higher than those of developed countries. The latter implies that each country is converging to its own steady state and that in the long run all the growth rates will be equalized. Since this study adopts the former definition, thus data on real per capita gross domestic product, denominated in common currency, for each country is used and US real per capita GDP is used to represent the rich country. Data on GDP and size of population are obtained from *International Financial Statistics* and the data are computed in common currency of US dollar by the author.

The present study examines the income convergence hypothesis in the context of US and the rest of selected OIC economies in the non-linear perspectives. The earlier literature on univariate analysis of

nonstationarity against stationarity has focused on the linear model, implicitly disregarding any possible non-linearities in the series under investigation. Recently, however, there has been increasing concern that the analysis of a linear model in a single time series may be inappropriate to give satisfactory inferences on important economic hypotheses. For example, the power of Dickey-Fuller (1979) unit root test has been called into question. Theoretical models of nonlinear adjustments have also been proposed in many areas of economics and finance. A growing number of studies have emerged along this line of research, see for example Enders and Granger (1998), Caner and Hansen (2001) and Lo and Zivot (2001). In particular, Kapetanios and Shin (2002) and Kapetanios et al. (2003) analyse the implications of the existence of a particular kind of nonlinear dynamics for unit root tests, and thus provide alternative frameworks for testing the null of a unit root against the alternative under which the time series of interest follow globally stationary processes. More specifically, Kapetanios and Shin (2002) consider self-exciting threshold autoregressive (SETAR) models and Kapetanios et al. (2003) examine nonlinear smooth transition autoregressive (STAR) models. Their Monte Carlo experiments clearly show that these types of nonlinear unit root tests are generally more powerful than the standard Dickey-Fuller unit root tests when the data follow either globally stationary SETAR or STAR processes.

The first empirical investigation on income convergence in this present study is done by conducting a formal linearity test of Luukkonen *et al*. (1988) (LST). If the results of this test suggest the presence of non-linearity, then the Kapetanois *et al.* (2003) (KSS) of non-linear test of stationarity is applied. Otherwise, the ADF linear test of stationarity is used.

The LST linearity test is adopted to determine whether the logarithm differences of real per capita GDP between two sample countries, ($\ln Y_{it} - \ln Y_{At}$) exhibits linear or non-linear behaviour. The test is specified as:

$$(\ln Y_{it} - \ln Y_{At}) = \alpha_0 + \sum_{k=1}^{p} \alpha_k (\ln Y_{it-k} - \ln Y_{At-k}) + \sum_{k=1}^{p} [\beta_{1k} (\ln Y_{it-k} - \ln Y_{At-k})(\ln Y_{it-d} - \ln Y_{At-d}) + \beta_{2i} (\ln Y_{it-k} - \ln Y_{At-k})(\ln Y_{it-d} - \ln Y_{At-d})^2 + \beta_{3i} (\ln Y_{it-k} - \ln Y_{At-k})(\ln Y_{it-d} - \ln Y_{At-d})^3 + \nu_t \quad (1)$$

where Y_{it} is the real GDP per capita of individual country under investigation and Y_{At} is the real GDP per capita of the US and υ_t is white noise residuals with zero mean and constant variance assumption. Practically, the null hypothesis to be tested is that

$$H_0 : \text{all } \beta\text{'s} = 0 \qquad (2)$$

against the alternative that at least one β is non-zero. If the null hypothesis is not rejected, it implies the absence of non-linearity. Otherwise, the rejection of null hypothesis means the existence of a type of non-linearity in favour of the Smooth Transition Autoregressive ,STAR(p), model . The F-type test statistics is employed for this test of non-linearity. The optimal lag length, p, and the delay parameter, d, have to be determined in advance. Following Taylor and Peel (2000), the optimal p is fixed based on partial autocorrelation functions (PACF). The linearity test is performed for a class of d ranges from 1 to 12. The optimal d is chosen from the one that minimizes the p-value of the F-test statistic. Results of this test are presented in Table 1.

In testing the convergence or divergence of income, the KSS non-linear stationary test is then conducted to detect the presence of non-stationarity against non-linear. The stationary STAR process can be specified as:

$$\Delta(\ln Y_{it} - \ln Y_{At}) = \delta(\ln Y_{it-1} - \ln Y_{At-1})^3 + \mu_t \qquad (3)$$

or

$$\Delta(\ln Y_{it} - \ln Y_{At}) = \sum_{k=1}^{p} \beta\Delta(\ln Y_{it-k} - \ln Y_{At-k}) + \delta(\ln Y_{it-1} - \ln Y_{At-1})^3 + \omega_t \quad (4)$$

where μ_t and ω_t are stochastic error terms each with zero mean and constant variance assumption. Equation (3) and (4) correspond to the conventional Dickey-Fuller (DF) and augmented Dickey-Fuller (ADF) stationary tests with no intercept and trend terms in non-linear framework. The divergence or convergence could be tested on δ using the t-statistics with the null hypothesis of $H_0 : \delta = 0$ (divergence) against the alternative of $H_1 : \delta > 0$ (convergence). The results of t-statistics estimated from equations (3) and (4) are reported in Table 2 as t_{KSS1} and t_{KSS2}. As suggested in Kapetonis *et al.* (2003), test of equation (4) is done for $1 \leq p \leq 12$ repeatedly and t_{KSS2} will only report the maximum

test statistics (or the minimum *p*-value of *t*-statistic). All these KSS test statistics are to be compared with the same set of critical values simulated by Liew and Lim (2005). This is because the conventional *t* critical values are no more applicable in this non-linear framework due to the asymptotically distribution of δ which has been proven non-normal.

3. Empirical Results

Results of LST Linearity test, from Table 1, have shown that income differentials between the US and all selected 10 economies, except for Burkina Faso, Nigeria and Saudi Arabia, cannot be taken as linear in nature. The inferences are made as the null hypothesis of the absence of non-linearity in most cases has been rejected by the *F*-statistics at less than 1% or 5% significance level. This finding suggests that the conventional ADF linear stationary test, which does not capture non-linearity in the data, is inappropriate to be employed in examining the issue of income convergence between the US and countries of Benin, Egypt, Malaysia, Oman, Bangladesh, Indonesia and Iran (7 economies). Thus, the KSS test should be used instead. As for Burkina Faso, Nigeria and Saudi Arabia, the conduct of ADF test is remained to be done since income differentials which involve these economies are linear in nature

Table 1: Results of LST Linearity Test

Country	*p*	*d*	*F*	*msv*	$Q_{Ljung\text{-}Box}$ *(msv)*
Burkina Faso	1	2	0.698	0.506	0.902
Benin	1	11	10.836***	0.000	0.045
Egypt	1	1	10.846***	0.000	0.537
Malaysia	1	12	5.997***	0.005	0.730
Oman	1	12	9.417***	0.001	0.150
Bangladesh	1	6	18.185***	0.000	0.675
Indonesia	1	12	3.191**	0.049	0.879
Iran	1	12	5.393***	0.007	0.515
Nigeria	1	1	2.051	0.129	0.599
Saudi Arabia	2	12	1.409	0.277	0.982

Notes: The optimal autoregressive lag length p is determined by inspecting the PACF of the series. The optimal delay parameter *d is* chosen from the one that minimizes the marginal significance value *(msv)* of the *F* test statistic. Ljung-Box portmanteau *Q* statistic is applied to test the presence of serial correlation up to 16 lags. Its *msv* is given in the last column.

Table 2 reports the results of stationary test for all countries using ADF test (for linear data) and KSS tests (for non-linear data). The t_{KSS1} test statistics, based on equation (3), have shown that the null-hypothesis of non-stationary (divergence) cannot be rejected in most cases, except for Bangladesh. As for t_{KSS2} test statistics, based on equation (4), the evidence of convergence is found in the case of Benin. Nevertheless, the Portmanteau Q statistics suggest that these KSS test statistics are not having a problem of serial correlation in its residuals.

In the case of Burkina Faso, Nigeria and Saudi Arabia, results of the ADF test suggest that income convergence is only be found for Burkina Faso, but not for Nigeria and Saudi Arabia.

Table 2: Results of Stationary Test

Country	Linear test	Non-Linear (KSS) tests			
	ADF(p)	t_{KSS1}	$Q_{Ljung\text{-}Box}$ ***(msv)***	t_{KSS2}	$Q_{Ljung\text{-}Box}$ ***(msv)***
Burkina Faso	-3.679(7)**	-	-	-	-
Benin		0.908	0.770	3.007(10)**	0.872
Egypt		2.232	0.115	1.531(8)	0.872
Malaysia		-1.117	0.839	-0.942(1)	0.979
Oman		-1.735	0.443	-1.697(3)	0.202
Bangladesh		3.397**	0.871	2.414(2)	0.793
Indonesia		1.031	0.985	2.179(7)	0.999
Iran		1.077	0.935	2.228(7)	0.948
Nigeria	-2.923(6)	-	-	-	-
Saudi Arabia	-2.622(1)	-	-	-	-

Notes: 1. In the t_{KSS2}, p is chosen from the one that maximizes the test statistics. For KSS test, the corresponding critical values are -2.66, -2.93 and -3.48 at 10%, 5% and 1% significance levels.
2. For the ADF test, p is automatically determined by computer programme based on the Minimum Akaike Information Criterion (AIC).
3. Ljung-Box portmanteau Q statistic is applied to test the presence of serial correlation up to 16 lags. Its marginal significance value *(msv)* is given for each t_{KSS}
4. *** denotes significant at 1% level, ** denotes significant at 5% level and * denotes significant at 10% level.

In summation, using linear and non-linear stationary tests (ADF and KSS tests), three countries, Burkina Faso, Benin and Bangladesh, are found exhibit convergence behaviour with respect to the US's income, whereas the rest of countries in study, namely, Egypt, Malaysia, Oman, Indonesia, Iran, Nigeria and Saudi Arabia show otherwise.

4. Income Convergence / Divergence and Globalization

The process of globalization is not occurring just recently. It has its roots in the second half of the eighteenth century. In O'Rourke (2001), O'Rourke and Williamson (2000) and Maddison (2001) and Williamson (2002), the period of 1870-2000 is classified into the first wave of globalization 1870-1913, the de-globalization period of 1913-1950, the golden age of 1950-1973 and the second wave of globalization of 1973 onwards.

The relation to world inequality, there are 3 main approaches distinguished by Wade (2001) on relationship of globalization and income inequality (divergence) or equality (convergence). The neoclassical growth models try to predict stylized facts of economic growth and one of them is convergence. It seems, empirically, that conditional on relevant characteristics for economic growth, there is a negative relation between initial income levels and growth rates of income of a certain period. This means that rich countries tend to grow less than poor countries, once some conditions are settled. This kind of convergence is known as conditional convergence and it is well forecasted by the NGM whenever economies have similar technologies and preferences. The NGMs are based on an economy with a specific production function and a utility function that represents its preferences. Under some assumptions, the economy will eventually arrive at an equilibrium called the steady-state, where it cannot grow anymore. If the economy is approaching its steady-state, there is convergence but if it is moving away from the steady-state, there is divergence. Neoclassical growth theory predicts that national economies will converge in their average incomes and average productivity levels because of increased mobility of capital. Earlier, the concept of conditional convergence was explained, which in short says that when the growth rate of a country is positively related to the distance from its initial level of income to its own steady-state. In other words, countries grow more if they are initially further away from their own steady-state.

Meanwhile absolute convergence exists when poor economies grow faster than rich ones, regardless of whether they have a common steady or not. So poor countries tend to"catch up" when time passes.

However, the endogenous growth theory predicts less convergence or divergence as diminishing returns to capital is offset by increasing returns to technological innovation in the developed countries. The endogenous models differ from the NGM in that they do not assume diminishing returns to capital. For example the one sector AK model is based on the following production function:

$$Y = AK;$$

(where Y is the output, K and A are the capital and technology respectively) which can be compared to a Cobb-Douglass when the share of capital is 1, $\alpha = 1$. This can be interpreted as a taking a broad definition of capital that includes human capital.

The third approach is the dependency approach which predicts that convergence is less likely and divergence more likely, because of differential benefits from economic integration and trade, restricted free market relations and locked developing countries to produce certain commodities.

The empirical evidence shows that convergence in per capita income did occur during the first wave of globalization due to an increase in international trade and massive international migration. However, the trend was not repeated in the second wave of globalization. Cornia and Court (2001) in a policy brief using the WIID database reports that inequality has risen since the early-mid 1980s. The non-traditional new causes of inequality identified are liberal economic policy regimes and the way in which economic reform policies have been carried out. Given the fact that rising inequality (divergence) threatens growth and poverty reduction, a study by Agenor (2003) has found the evidence of an inverted U-shape relationship between globalization and poverty in developing countries, indicating that at low (higher) levels tends to increase (reduce) poverty.

Table 3: 2003 Global Index (GI) Ranking (selected countries)

Rank	2003 GI	Rank	Economic	Rank	Technological	Rank	Personal	Rank	Political
18	Malaysia	8	Malaysia	26	Malaysia	14	Malaysia	27	Nigeria
37	Nigeria	22	Nigeria	43	S.Arabia	24	S.Arabia	35	Bangladesh
41	S.Arabia	47	Indonesia	48	Iran	43	Bangladesh	46	Malaysia
48	Egypt	49	S.Arabia	51	Indonesia	47	Egypt	49	Egypt
55	Bangladesh	58	Egypt	53	Egypt	52	Nigeria	53	Indonesia
59	Indonesia	59	Iran	61	Nigeria	61	Indonesia	59	S.Arabia
62	Iran	62	Bangladesh	62	Bangladesh	62	Iran	61	Iran

Notes: Burkina Faso, Benin and Oman are not included in the list of 2003 GI Rankings by A.T. Kearney(2003)

As for the 10 selected economies in this study, their evidence of income convergence/divergence is somehow related to their level of globalization. Using Globalization Index (GI) created by A.T. Kearney/Foreign Policy Magazine (2002, 2003), 7 countries in this study are ranked based on the 2003 GI Rankings. The rankings are displayed on Table 3 for only 7 countries as the other 3 countries (Burkina Faso, Benin and Oman) are not listed within 62 countries observed by Kearney.

The data used in the computation of the GI consists of a number of variables on economic integration, personal contacts, technology, political engagement and supplement data. These are expected to proxy the channels through which globalization affects world inequality, in particular, the dynamic convergence in per capita income growth towards the steady state[†].

It is shown on Table 3 that Bangladesh, who has proven to experience income convergence in this study, has lower ranking in the degree of globalization. Four countries (Malaysia, Nigeria, Saudi Arabia and Egypt) which proven to have income divergence, on the other hand, are among the countries who are highly ranked in the level of globalization. To be specific, high degree of globalization economically (refer to column 3 and 4 of Table 3) and technologically (refer to column 5 and 6 of similar table) are the causes of income divergence in the countries in study. Among seven countries, six countries (Malaysia, Nigeria, Indonesia, Saudi Arabia, Egypt and Iran) have higher level of globalization economically and technologically but they experience income divergence (inequality). In contrary, Bangladesh who is ranked the lowest in globalization economically and technologically, however, exhibits income convergence (equality). Note that this relationship between earlier results of income convergence/divergence and ranking of globalization is not been made without limitation. Due to limited data of 10 countries only, the regression could not be made to observe the relationship of the variables and therefore, no controlled variables are involved. The observation or relationship is only been made descriptively base on the movements of both variables. Thus, the results or inferences should be taken with precaution.

[†] See detail in Heshmati (2003) for sub-components of these variables.

The observation seems to support the endogenous growth theory which predicts divergence because of increasing return to technological innovation in developed countries and the dependency approach which predicts that divergence is more likely because of differentiated in benefits from economic integration and trade and locked production structure in less developed nations. Thus, not necessary globalization will lead to income convergence of a country with respect to another developed country. As argued by Pritchett (1996), developing countries need "policy-conditional" conditional convergence. This could be learned from the examples of Japan, Korea and recently, China. That is, if a country's initial income is low and its government pursues growth-oriented policies, then very rapid growth rates may be possible. Sachs and Warner (1995) have also recently suggested that countries that adopted such policies did in fact exhibit very strong conditional convergence, while those poor countries that did not adopt them did not display any conditional convergence.

5. Conclusion

This study aims to investigate the existence of income convergence and divergence among ten selected OIC countries. Using linear and non-linear stationary tests on income differentials between these countries and the United States, it is found that only Burkina Faso, Benin and Bangladesh exhibit income convergence (equality) while the rest of the countries exhibit income divergence (inequality). In link to degree of globalization in these countries, it could be precautiously concluded that those countries which ranked higher in term of globalization economically and technologically are also those that experience income divergence. But those ranked lower in degree of globalization economically and technologically exhibit income convergence. These stylized facts seem to support predictions of endogenous growth theory and dependency approach on relationship between globalization and income inequality.

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