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Economic Factors Affecting Distribution of Income Among Nations: A Preliminary Discussion

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Abstract

This paper focuses on understanding the role and significance of some economic and non-economic factors such as socio-demographic variables in explaining the observed inter-country variations of income inequality across the globe as part of this preliminary discussion. It found strong support for the Kuznets hypothesis as well as the role and significance of a number of economic and socio-demographic variables in explaining the observed wide inter-country inequality variations. The paper intended, but could not incorporate the institutional and cultural factors in the model due to time constraints. Subsequently, the paper proposes to develop a more robust empirically testable model that incorporates the traditional economic and socio-demographic variables along with some additional non-economic variables such as institutions and culture explicitly in the model in explaining inequality differences across the globe. The final sample used in this study consists of 72 countries primarily for 2008 involving data for as many countries for which data could be collected from published international and country-specific sources such as the World Bank, the IMF and other sources. The model was estimated using statistical and econometric tools with appropriate diagnostic checks on the data as appropriate. The study is interdisciplinary in nature since it incorporated variables going beyond the economic factors by incorporating socio-demographic, institutional and cultural variables in the framework of analysis and, as such, the study would be of interest to a wide interdisciplinary body of academics, researchers, policy-makers, thinks tanks, civil society including various non-

governmental organizations, and international organizations, among others.

Introduction

The issue of income distribution has been and continued to remain to be a very thorny issue. In the theoretical discussion, the debate on the role and impact of inequality in the process of development has remained intense among conservative, liberal and radical ideological thinking (Ahluwalia, 1976; Alesina and Rodrik, 1 994; Alesina and Perotti, 1996; Banerjee and Duflo, 2003; Barro, 2000 and 2008; Charles-Coll, 2013; Chenery et. al., 1974; Dowrick and Akmal, 2001), Gupta and Islam, 1983; Hicks (1979), Hirschman and Rothschild, 1973; Kuznets, 1955, Krugman, 2006; Krugman and Venables, 1995; Sen, 2001, Wade, 2001a, 2001b and 2001c), among others). In the empirical studies, the possible role of income inequality and its various determinants have been extensively studied empirically by various researchers with conflicting results and hence with little resolution of the debate. The purpose of this paper is **not** to examine on how income inequality affects savings and growth and economic development, but it's opposite, i.e. to examine empirically what economic and noneconomic factors explain and determine observed differences in income inequality among nations in a cross-country setting. In a later stage, the paper intends to develop and then empirically test a more robust and extended empirical model to explain the role and determinants of various factors affecting income inequality, particularly expanding on the currently reported model to incorporate the role of formal institutions and informal institutions (culture) on inequality. The sample will consist of as many countries for which data is available from published international and country-specific sources. The model will be estimated using advanced econometric methods with appropriate diagnostic checks on the data as appropriate.

Hypothesis Development

It is widely recognized in the extant literature that there is a strong relationship and interconnection between income inequality on one hand and economic growth or development on the other (Ahluwalia, 1976; Alesina and Rodrik, 1 994; Alesina and Perotti, 1996; Banerjee and Duflo, 2003; Barro, 2000 and 2008; Chenery et. al., 1974; Gupta and Islam, 1983; and Kuznets, 1955, among others). Some studies have focused on how inequality affects growth (see for example Ahluwalia, 1976; Alesina and Rodrik, 1 994; Alesina and Perotti, 1996; Banerjee and Duflo, 2003; Barro, 2000 and 2008; Charles-Coll, 2013; Gupta and Islam, 1983; Hicks, 1979, among others), others have studied how economic growth affects inequality, and yet others have examined both inequality and growth within a simultaneous system where both variables may influence each other in the sense of bi-directional feedback relationship (Gupta and Islam 1983). The focus of this paper will be to follow the second approach, i.e. to empirically examine how economic growth and development along with other economic and non-economic factors affect income inequality (income distribution), **not** the other way around. In this spirit, we will develop an empirically testable model where some measure of inequality will be the dependent variable and then estimate the model using cross-country data. The empirically testable model is discussed below.

Following the approach mentioned above, this paper will first discuss the basic economic model of inequality that will be based on the well-known and seminal work of Kuznets (1955)

which is known as Kuznets hypothesis in explaining the long-run influences of economic development on income inequality. Based on historically observed patterns of changes in income inequality with the changes in economic development of today's advanced economies over decades, Kuznets posits a non-linear relationship between the two above-mentioned variables. He hypothesizes that income inequality in a nation would initially increase with economic development for some time after which inequality will start to diminish with development beyond some critical level of development has been reached. Designating the measured inequality concept by the symbol INQ and the level of development by GDP per capita in PPP$ (Yppp), the Kuznets hypothesis can be empirically formulated in the form of a basic inequality model of as follows:

(1) $INQ = b_0 + b_1\ Yppp + b_2\ Yppp^2 + u$

Where:

INQ = Some measure of the degree of income inequality in a nation to be specified below
Yppp = Per Capita Real GDP in PPP$, a measure of the level of development of a nation
$Yppp^2$ = Squared Per Capita Real GDP in PPP$
u = random error term with the usual statistical properties such as with zero mean and constant variance
b_0= Intercept coefficient = ? (Uncertain)
b_1 = Slope coefficient with respect to Yppp > 0
b_2 = Slope coefficient with respect to $Yppp^2 < 0$

In this basic inequality model, the first slope coefficient is expected to be positive (b1 > 0) and the second slope coefficient is expected to be negative (b2 < 0) in order to support the Kuznets hypothesis. For empirical estimation, the basic model given in equation (1) will be extended by incorporating several additional economic and socio-demographic variables such as the short-run one-period lagged growth rate of real GDP (GYL), growth rate population (GPOP), and the degree of openness and global integration (GLOBE) to account for influences of other factors on income distribution as follows and this model is termed as the extended basic inequality model:

(2) $INQ = b_0 + b_1\ Yppp + b_2\ Yppp^2 + b3\ GYL + b4\ GPOP + b_5\ GLOBE + u$

Measuring INQ by the widely used measure of inequality known as Gini Coefficient (GC), we can rewrite equation (2) as follows:

(3) $GC = b_0 + b_1\ Yppp + b_2\ Yppp^2 + b3\ GYL + b4\ GPOP + b_5\ GLOBE + u$

Based on past research and the review of extant literature, the hypothesized impact of the explanatory variables on inequality would be expected to have the signs as follows:

b_0 = ? ; $b_1 > 0$; $b_2 < 0$; b_3 = ? and $b_4 > 0$; and b_5 = ?

The sign "?" assigned to a coefficient implies uncertain impact of that variable in the

sense that the marginal impact can be positive or negative or zero to be explained below. In this paper, equations (1) and (3) will be the multivariate linear regression model for empirical estimation and hypothesis testing. The hypothesized positive sign for b_1 and negative sign for b_2 would support the validity of Kuznets hypothesis as already discussed earlier.

With respect to the short-run growth rate variable, the sign of coefficient b_3 is expected to be uncertain as there is controversy of whether short-run higher growth rate of the economy (GYL) will increase or reduce inequality. The anecdotal and other evidence suggests that higher economic growth has increased inequality in some nations (such as China, India, and Brazil) but decreased in other nations (such as South Korea, Hong Kong, Singapore, and Taiwan).

On the other hand, higher population growth rate (GPOP) is expected to increase inequality (Birdsall, 2002; Garvy, 1952; Wade, 2001a and 2001c). For example, Garvy (1952) mentioned about demographic factors such as age and gender composition of the labor force. One important demographic factor that may influence the age and gender composition of the labor force could be population growth rate. Based on the above discussion, this variable can be hypothesized to increase inequality across countries as different nations have differing rates of fertility and population growth rates (Birdsall, 2002; Garvy, 1952; Wade 2001a and 2001c). Such a positive effect is posited because higher population growth rate in a nation may exert severe pressure on the country's scarce natural resources (both renewable and non-renewable), capital resources (both physical and human), and other resources, which may push more people into unemployment and poverty thus exacerbating inequality within that nation. As such it is hypothesized to have a positive effect on inequality ($b_4 > 0$).

Like GDP growth rate's impact on inequality, there is controversy on the possible impact of globalization (GLOBE) on income distribution. There are some who argue that globalization and openness will reduce inequality (as argued by pro-globalization view) whereas others argue the opposite effect (as argued by anti-globalization view). With respect to the impact of globalization on inequality among nations, Krugman and Venables (1995) argue, using a theoretical construct within the framework of monopolistically competitive market structure, that globalization's effect on inequality is uncertain. It is conditional upon decline in transport costs, i.e. if transport cost declines, global inequality may increase initially, but further decline in transport cost below some critical level, globalization may in fact reduce inequality. He did not test this hypothesis using data and any statistical or econometric analysis. Based on the above discussion, the model posits an uncertain expected sign for the impact of globalization on income inequality (b5 = ?).

Discussion of Empirical Results

This section is divided into several subsections to discuss measurement of the variables, data sources, time period of the study, statistical methodology, and some preliminary results obtained as of the Hawaii University International conference proceedings submission deadline. These are discussed below.

Data and Estimation Method

The well-known and widely used Gini coefficient (GC) was used as the dependent variable for this study. Gini coefficient measures the extent to which the income distribution in a country deviates from the notional perfect equality of income or purchasing power or any other dimension. The range of GC is gives as $0 \leq GC \leq 1$. A Gini coefficient value of zero indicates perfect equality (everyone earns the same income) and a coefficient of one indicates perfect inequality (one person holds all the income and everyone else has zero). In this paper, GC is measures in the percentage form with the range $0 \leq GC \leq 100$.

The level of development was measured by the purchasing power parity adjusted per capita GDP (Yppp) instead of the unadjusted simple real per capita GDP in US$. The variable Yppp2 is simply the squared value of Yppp to capture the Kuznets' non-linear effect. The variable GYL is the one-year lagged annual percentage growth rate of real GDP of a country. One-year lagged value is used in order to avoid the controversy over the issue that both current inequality (GC) and current growth rate (GY) could be endogenous, i.e. jointly determined as part simultaneously of a simultaneous system. A lagged value of the growth rate (GYL) would resolve this issue of endogeneity. The variable GPOP is the annual percentage growth rate of population of a nation. Finally, the variable GLOBE represents the degree of openness and global integration of a nation and is measured by trade globalization, i.e. goods and services as percentage of GDP of a nation.

The data was collected from various published international sources, notably that of the World Bank, the IMF, and other sources. The study started with collecting data for all 215 countries in the World Bank data base, but the final sample size that was used in the analysis in this paper came down to 72 countries. The final sample of countries was determined by the availability of data for all included variables in the model. The sample was particularly constrained by the data availability of the inequality variable (GC). For cross-country analysis, we selected 2008 as the year because data for GC were available for the highest number of countries (49 counties) for this year compared to any pre-2008 or post-2008 years in the World Bank data base. But given that the sample size was still not very large, it was decided to try to expand the sample size by including in the sample the value of GC for a country for which data for 2008 was not available, but it was available for either one year before (2007) or one year after (2009). This was done on the assumption that the income distribution is very slow to change and as such one year before or one year after values would be reflecting values for 2008 for those countries. This inclusion increased the sample size from 49 countries to 75 countries, an expansion by 26 countries. However, the final sample size became a few countries short of 75 countries because data on a few other countries within this group were not available for several explanatory variables, thus reducing the sample size to 72 as the final sample size for estimation purposes.

Further, since economic development is a long-run concept and since the GC variable was mostly for 2008, but several countries GC were from 2007 or 2008, we took average for the Yppp variable over the three year period from 2007 to 2009, the average being centered on 2008.The GYL variable was for 2007 as it was a lagged variable to avoid the endogeneity issue as discussed before. The remaining two explanatory variables GPOP and GLOBE were from year 2008.

Given the sample selection and time period of the data, the study first examined some descriptive statistics including measures of central tendency (mean and median values), measures of variation measures (maximum, minimum, and standard deviation), measures of skewness (tail of the distribution) and kurtosis (peakedness of the distribution), and the Jarque-Bera statistics along with its associated values to test for the normality of the distribution of each variable. Beyond this descriptive analysis for individual variables in the sample, the empirical model (equation (1) and (3)) were estimated using the standard multivariate linear regression technique. Finally, the simple correlation matrix was checked for the existence of multicollinearity between pairs of explanatory variables included in the model.

Descriptive Analysis

This section provides some descriptive statistical analysis of the variables used in this study. Table 1 provides summary statistics of these variables such as mean, median, minimum, maximum, standard deviation, skewness, kurtosis, and the Jargue-Bera statistics with the associated probability values. First, focusing on the dependent variable in this study, the Gini Coefficient (GC) as a measure of inequality in this study, the statistics shows inequality varies widely from country to country with a low of 26.86 to a high of 65.77 having a mean value of 40.48 and a standard deviation of 9.12 in the sample 77 countries. In income distribution studies, median value is considered as a better measure of the central tendency of the distribution. Looking at the median value of 38.95, it indicates that 50% of the countries in the sample have lower inequality below this value and 50% of the countries have a value above it. The skewness value of 0.72 shows that the income distribution is slightly positively (right) skewed and the kurtosis value of 3.06 shows that the distribution is close to the peakedness of a normal distribution of 3.00. However, the Jarque-Bera statistic of 6.19 with its probability value of 0.04 indicates that the GC distribution deviates from the normal distribution (the null hypothesis of normal distribution is rejected at the 5% level of significance).

Table 1: Summary Statistics for GC and Independent Variables

	GC	Yppp	Yppp2	GYL	GPOP	GLOBE
Mean	40.47944	7815.504	1.40E+08	7.720347	1.458181	41.44896
Median	38.95000	5719.249	32709805	6.838000	1.395800	37.47806
Maximum	65.77000	68592.90	4.70E+09	25.04900	16.49351	99.49958
Minimum	26.86000	425.7293	181245.5	-0.850654	-0.541462	9.882786
Std. Dev.	9.117486	8944.040	5.58E+08	4.670357	2.147943	19.48911
Skewness	0.722751	4.558433	7.886175	1.333296	4.882844	0.776338
Kurtosis	3.062415	31.15947	65.03561	5.727289	34.99092	3.283844
Jarque-Bera	6.192888	2591.717	12120.84	43.04026	3309.748	7.370306
Probability	0.045210	0.000000	0.000000	0.000000	0.000000	0.025093
Sum	2874.040	554900.8	9.94E+09	548.1447	103.5308	2942.876
Sum Sq. Dev.	5818.999	5.60E+09	2.18E+19	1526.856	322.9562	26587.78
Observations	72	72	72	72	72	72

With respect of the explanatory variables, the level of economic development as measured by the purchasing power parity (ppp) adjusted per capita income (Yppp), this variable

shows wide variation across countries as expected since different countries are at a different level of development at a given point in time. In terms of the international ppp$, the level of development varies from a low of 425.73 (very low level of development) to a high of 68,592.90 with a mean of 7,815.50, median of 5,719.25, and a standard deviation of 8,944.04. The skewness value shows it is strongly positively skewed and the kurtosis value shows it has much higher degree of peakedness than the normal distribution. As such, the Jerque-Bera statistics rejects the null of normal distribution at less than 1% level of significance.

The next explanatory variable, the one year lagged annual percentage growth rate (GYL), shows wide variation across the countries as expected. The sample statistics shows growth rate varies from a low of -0.85% to a high of 25.05% in the sample with a mean value of 7.72% and a standard deviation of 4.67%. The skewness statistic shows positive skewness and the kurtosis value shows above normal peakedness, and the Jarque-Bera statistic clearly rejects the null of normal distribution at less than 1% significance level.

Next explanatory variable is the annual percentage growth rate of population (GPOP), which varies from a low of -0.54% (negative growth) to a high of 16.49% (high growth) with mean and standard deviation respectively of 1.46% and 2.15%. The skewness value shows positive skewness and the kurtosis value shows strong above normal peakedness and the Jarque-Bera statistics rejects the null of normal distribution at better than1% level of significance.

Finally, the degree of openness and global integration as measured by the trade globalization variable GLOBE, this variable also varies widely across countries with a low degree of openness of 9.88% to a high degree of 99.50% with a mean and standard deviation respectively of 41.44% and 19.49%. This variable shows slightly positive skewness and slightly above normal peakedness with the resulting Jarque-Bera statistics showing rejection of the null of normal distribution at better than 5% significance level.

Overall, the descriptive statistics shows that the dependent and the independent variables show wide variation across the globe and with all the variables deviating from normal distribution. The presence of wide variation of the variables, particularly the dependent variable, helps in understanding and isolating the marginal impact of the explanatory variables to on the dependent variable using a multivariate regression analysis. It is to be noted here that the observed deviation of the variables from normal distribution does not invalidate the regression analysis (Ramunathan, 1989) that is reported later.

Before conducting formal regression analysis, it would be useful to examine the simple correlations between the dependent variable (GC) and the explanatory variables. From Table 2, it appears that the simple correlations of the explanatory variables with the GC are not very strong and are of varying signs. GC appears to be weakly but positively correlated with both the long-run level of economic development variable Yppp and its squared term Yppp2 but negatively correlated with the short-run lagged growth rate variable (GYL). The population growth rate variable GPOP is positively correlated with GC at slightly higher degree and the degree of globalization variable (GLOBE) is negatively correlated with the dependent variable. It is to be noted here that these correlations just provide some preliminary indications of the sign (positive or negative) and strength of the relationship of the dependent variable with the explanatory

variables. However, these correlations are not indicative of the theoretically expected direction of and causality linkage between the dependent variable and the explanatory variables. The causal nature and direction of such relationships were discussed earlier based on theoretical considerations in the hypothesis development section and such hypothesized relationships would be empirically tested and reported in the next section.

Table 2: Pearson Correlation Matrix of GC with Independent Variables

	GC	Yppp	Yppp2	GYL	GPOP	GLOBE
GC	1.000000	0.035478	0.013599	-0.147840	0.142784	-0.081081
Yppp		1.000000	***0.899860***	0.224155	***0.512239***	0.249419
Yppp2			1.000000	0.260159	***0.789767***	0.114198
GYL				1.000000	0.292596	0.192008
GPOP					1.000000	-0.033224
GLOBE						1.000000

Regression Results

This section reports and analyzes the empirical results obtained from multivariate regression analysis. The estimated coefficients of the basic inequality model representing the Kuznets curve hypothesis as depicted in equation (1) earlier along with various statistics are reported in Table 3. A careful analysis of the results indicates that the basic regression model did perform very poorly based on standard statistical and econometric criterion. The R-squared and the adjusted R-squared values are very low and the coefficients of the two explanatory variables are not statistically significant based on the usual t-values (or the corresponding standard error of the coefficients), although both variables bear the expected positive and negative signs a la Kuznets hypothesis. Further, a very low value of the F-statistic (0.14) with its associated high probability value (0.86) clearly indicates that the overall regression is not statistically significant. The overall poor performance of the basic model is perhaps due to “omitted variables” effect, causing omitted variable bias. This is indicated by the very strong significance of the intercept term at better than 1% level of significance, which captured the impacts of the omitted variables.

Table 3: Regression Results of the Basic Inequality Model (EQ 1)

Dependent Variable: GC				
Method: Least Squares				
Date: 10/28/13 Time: 16:28				
Sample (adjusted): 1 209				
Included observations: 72 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	39.45098	1.972183	20.00372	0.0000
Yppp	0.000149	0.000282	0.527997	0.5992
Yppp2	-1.87E-09	4.53E-09	-0.413303	0.6807
R-squared	0.004310	Mean dependent var		40.34583
Adjusted R-squared	-0.024551	S.D. dependent var		9.123756
S.E. of regression	9.235074	Akaike info criterion		7.324668
Sum squared resid	5884.775	Schwarz criterion		7.419529
Log likelihood	-260.6881	Hannan-Quinn criter.		7.362433
F-statistic	0.149333	Durbin-Watson stat		1.882032
Prob(F-statistic)	0.861560			

The estimated coefficients of the extended inequality model as specified in equation (3) earlier along with various statistical tests are reported in Table 4. A careful analysis of the results shows that the extended inequality model did perform much better than the basic model based on various standard statistical and econometric criterions. The R-squared and the adjusted R-squared values are now much higher at 0.21, indicating that about 21% of the observed variation of the dependent variable is now explained by the five explanatory variables and the intercept term (including the previous two variables). This much improved result indicates that the basic model suffers from the omitted variable bias. However, the author recognizes that the R-squared value is still quite low perhaps due to non-inclusion of possible other important and relevant explanatory variables, such as institutional and cultural variables in addition to other economic or socio-demographic variables. Further, the F-value of 3.48 with its associated p-value of 0.007 indicates that the overall regression is statistically highly significant at better than 1% level.

For the individual coefficients, all the explanatory variables including the intercept term are highly statistically significant at better than 5% level of significance except for the GLOBE variable. Further, all the variables are consistent with the theoretically expected signs of the coefficients. The variables Yppp and Yppp2 have the expected positive and negative signs and are statistically highly significant, thus providing strong evidence in favor the Kuznets hypothesis that inequality initially increases with the level of economic development and declining at a later as countries evolve through the long-run development process. This result is consistent with the existence of a trade-off between equity (inequality) and efficiency (growth) in the initial stages of development in the sense that higher level of development initially will generate higher level of inequality, but that the tradeoff goes away as the country evolves into a higher stage of development in the long run.

Table 4: Regression Results of the Extended Basic Inequality Model (EQ 3)

Dependent Variable: GC				
Method: Least Squares				
Date: 10/28/13 Time: 17:09				
Sample (adjusted): 1 209				
Included observations: 71 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	33.62161	3.788314	8.875084	0.0000
Yppp	0.001307	0.000402	3.253035	0.0018
Yppp2	-3.10E-08	8.81E-09	-3.516034	0.0008
GROWTHL	-0.444875	0.230721	-1.928196	0.0582
GPOP	4.435969	1.159331	3.826317	0.0003
GLOBE	-0.049626	0.056182	-0.883318	0.3803
R-squared	0.211235	Mean dependent var		40.47944
Adjusted R-squared	0.150561	S.D. dependent var		9.117486
S.E. of regression	8.403132	Akaike info criterion		7.175808
Sum squared resid	4589.821	Schwarz criterion		7.367020
Log likelihood	-248.7412	Hannan-Quinn criter.		7.251847
F-statistic	3.481469	Durbin-Watson stat		1.438356
Prob(F-statistic)	0.007534			

Turning now to the remaining explanatory variables, if one looks at the short-run growth rate variable (GYL), it has a statistically significant negative sign, indicating that higher growth can produce lower inequality, which supports the hypothesis that there may not be any tradeoff between equity and efficiency at least in the short run. With respect to the population growth rate variable (GPOP), it has the expected positive sign and it is statistically highly significant at better than 1% level of significance, supporting the proposition that countries with higher population growth rates will experience higher level of inequality, other factors remaining the same.

Last but not the least, the marginal impact of the openness and global integration variable (GLOBE) appears with a negative sign, but it is not statistically significant at any conventional level of significance. This result does not support either the hypothesis that globalization increases inequality or that globalization reduces inequality. This result is not totally surprising or unexpected because the theoretical expectation was that it may have an uncertain effect, i.e. globalization may increase or decrease inequality as discussed earlier. It is possible that globalization releases some forces that work to enhance inequality and other forces that work to reduce it. In such a situation, it is possible that the inequality enhancing forces may be have been countered by the inequality reducing forces of globalization.

The above reported empirical results of the coefficient estimates and their statistical significance could have been imprecise and unreliable if the included explanatory variables are found to be highly collinear. Further examination of simple correlations among the explanatory variables reported in Table 2 above, it seems that multicollinearity could have some effects, but it does not seem to be too serious an issue in this data set. The correlation coefficient between Yppp and Yppp2 is r = 0.89, which is quite high and is expected because one is the squared value of the other. Further, the correlation coefficient between Yppp and GPOP is moderate at r = 0.51 and that between Yppp2 and GPOP is moderately higher at r = 0.79. The correlation

coefficient between other pairs of explanatory variables was found to be low. As such, it is concluded that the coefficient estimates and their corresponding t-values were not too much influenced by the presence of some multicollinearity among the included explanatory variables.

Conclusion

This paper proposed to empirically test the Kuznets hypothesis along with the estimation of the impact of possible various other economic and non-economic (such as socio-demographic, institutional and cultural) variables on observed inter-country variations of inequality. Using Gini coefficient as a measure of inequality, the paper finds wide variation of inequality across the globe and that this variation can be partially explained by several included economic and socio-demographic variables. Although the explanatory power of the extended inequality model remins low, but the overall regression was found to be highly significant and most coefficients were found to have the expected signs and were statistical highly significance except the GLOBE variable. Kuznets hypothesis of an inverted U curve relationship was verified with this data set along the evidence that high economic growth rate reduces inequality whereas population growth rate enhances inequality. The global integration variable had had no significant impact on inequality.

Several limitations of the paper and possible avenues for further extension and re-estimation of the extended inequality model are discussed below. Firstly, the study assumed that the errors are homoskedastic in nature in the sense that the error term (u) in equation (1) and (3) is independent of any explanatory variable in the model. But this study did not test for its validity. If and to the extent that the error terms is not homoskedastic (i.e. heteroskedastic), the reported standard errors and the t-values may not be reliable to judge the statistical significance of the explanatory variables, even though coefficient estimates themselves may be unbiased (Ramunathan, 1989). The authors intend to conduct this test and make appropriate correction to obtain the heteroskedasticity consistent standard errors and the associated t-values. Further, given the observed low R-squared value and statistically highly significant intercept coefficient, these seem to indicate that even the extended model (equation 3) needs to be extended further to include additional possible omitted variables such as additional economic and socio-demographic, and more importantly various institutional and cultural variables.

The author intends to pursue further research along these lines indicated above such as empirically test and then correct for heteroskedasticty (if exists) and to add other so far omitted but relevant explanatory variables to uncover their marginal impacts on inequality across nations. As such, because of these and other limitations, the reported results in this paper needs to be interpreted with some degree of caution.

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