

A Cross Sectional Analysis On Economic Growth and Income Inequality

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Abstract:

This paper aims to empirically estimate the effect of economic growth on income inequality for the time period of 2016. To conduct the study a total of 144 countries are taken with four independent variables. Using the method of cross sectional analysis the study finds that there is a positive association between GDP Per Capita & income inequality and negative association between unemployment & income inequality .These to findings are explained in a very different way also. After these two exceptional findings the paper concludes with the related policy recommendation.

Keywords: Economic Growth, Income Inequality

Introduction:

There is a noteworthy connection amongst income disparity and economic evolution. This relationship had a great attention to the researchers and policymakers, so that they researched a lot on this relationship. As we know financial system plays a vital role to improve our economic development, so each and every country should follow a path which decreases income inequality. Normally, in poor or underdeveloped or developing countries, when the population rate increases there occurs income inequality. That means the income distribution rates are not equal to all which is absolutely unfair. Because in many poor and underdeveloped countries with a large population, mostly people are uneducated, tend to work any type of work. Furthermore, the free market economy is working in a way where automatically as the poor people are uneducated so they are less skilled, that's why they are contributing less to the economic activities. So their income is low which occurs income inequality.

In contrast, there is a different situation in the developed countries. The financial system of a developed country is totally different than a underdeveloped country. There, the government is able to contribute equally to all the people at the similar time. The income inequality is very rare in established countries because in developed countries government has structured income redistribution system. For example, if we look at Sweden, the government takes more than 50% money what a person earns, as income tax. So people have to pay more than 50% what s/he earns as income tax. The government takes the money and redistribute the money among poor people so that everyone can be treated equally.

So this is how the Swedish government is trying to distribute the income equally and so on.

Here we have taken 144 countries and will analyze how different countries are maintaining the connection amongst economic growth and income inequality.

Literature Review

There have been innumerable studies conducted to empirically scrutinize the connection between income inequality and economic growth. The studies have been accomplished using different methods, techniques and time periods. This segment delivers a transitory appraisal of literature of the relevant academic works.

Checchi. D (2003) conducted a Cross-Country Analysis; used panel data of 108 countries which consists the year of 1960-95. The core outcome of this investigation is that, once we regulate for the degree of progress with the (log of) per capita output, monetary restraints seem essentially significant in restraining the right of entry to secondary education.

Oitchovsky. S (2005) conducted a study to empirically measure the connotation amongst economic growth and inequality by means of equivalent data on nonrefundable earnings from the Luxembourg Income Study. This study found dissimilarity at the topmost end of the dissemination is confidently linked with development, however inequality lowers down the dissemination is adversely correlated to succeeding development.

A similar cross sectional study conducted by **Castells. D (2011)** found that inequality is a limiting factor for remote future development, particularly for poverty-stricken countries, hen associated with increasing concentration of economic activity at the urban level, is likely to enhance growth in the short and medium-run in those low income countries.

A cross country analysis of 60 rising and established countries for the year from 2000-2010 conducted by **Akbiyik.C (2012)** found that there is a linear adverse affiliation amongst commercial progress and income disparity which proclaims that commercial progress eases income disparity.

Lee. H, Kim. J & Cin. B (2013) studied the drifts and acknowledged the determining factors of earnings dissimilarity in Korea from the year from 1980 to 2012. The analytically substantial negative assessment of the speculation or investment segment in GDP demonstrations that a rise in speculation would decrease the income inequality

Suwoto.T & Zhai.Y (2016) used panel data of 225 counties from 2011 to estimate the effects on inequality on GDP employing the variables come Inequality, Economic Growth, Growth of Gross Domestic Product, Gini Coefficient, Gross Savings, Fertility Rate, Unemployment Rate, Mean School Years. This study initiated a optimistic affiliation amongst income disparity and economic growth.

Islam.R (2017) performed a Time Series Analysis; using the data of over the period 1960-2015 to investigate the influence of earnings inequality on commercial development in Japan. Empirically it showed that the income inequality significantly hinders Japanese growth. Additionally, greater inequality increases relative redistribution and reduces investment, education, and property rights protection, which may, in turn, hamper growth.

An extensive research work done by **Yee. L, Xin. L, Hun. L & Tien. Q (2017)** using panel data on 82 selected counties from the year 1996 to 2000 found that developed and developing countries have different impact on inequalities. In the developed countries, GDP, trade, FDI and inflation are found to be significant with income inequality while in the developing countries, trade has found to be insignificant whereas GDP, FDI and inflation are significant towards the income inequality.

Methodology:

From literature review we can see that most of the studies have conducted ‘Time Series Analysis’ or ‘Panel Data Analysis’ but in this paper we have tried to conduct “Cross Sectional Analysis” with a more recent time period (2016) and 144 countries. The list of countries is given in the appendix.

In our model we have taken 5 variables (one dependent variable and four independent variables) and 144 observations of the year 2016.

Our regression model is given below:

Model:

Income inequality $i = \beta_0 + \beta_1 \text{ per capita GNE } i + \beta_2 \text{ GDP } i + \beta_3 \text{ Ps } i + \beta_4 \text{ Unemp } i + u_i$ The variables explanation is given after the list of countries.

Variable Description

Dependent Variable:

Income Inequality measured by GINI index (World Bank estimate)

Simply, the income inequality is measured by the Gini Index which represents the distribution of wealth or income of the whole residents of a nation.

Explanatory Variables:

GDP Per Capita Growth (Annual %)

GDP Per Capita Growth represents the country's economic output which accounts for its number of citizens. It is divided by the country's gross domestic product by the total population of the country.

Gross National Expenditure (% of GDP)

Simply, it is the country's total expenses, which includes both private and public expenses but it excludes export expenses.

Unemployment, total (% of total labor force) (modeled ILO estimate)

Unemployment denotes to the segment of the labor force those do not have any work but accessible for and in search of employment.

Political Stability and Absence of Violence/Terrorism: Estimate

Political Stability and Absence of Violence/Terrorism measures observations of the possibility of political insecurity and/or politically-motivated violence, including terrorism.

So our method is Cross Sectional Analysis. The time period is 2016. Total countries are 144.

Data Source: World Bank Database

1. World Development Indicators
2. Country Policy and Institutional Assessment
3. World Bank Governance Database

Data Analysis and Interpretation:

*Output of linear regression analysis in Stata:

Number of observation = 137

F (4, 132) = 0.80

Probability > F = 0.527

R- Squared (R2) = 0.024

Adj. R - Squared = -0.006

Root MSE = 8.084

Source	SS	df	MS
Model	209.369	4	52.342
Residual	8625.277	132	65.343
Total	8834.645	136	64.961

Variable	Coefficient (Std. Err.)
gdp	0.025 (0.217)
gne	0.014 (0.049)
ps	-1.228 (0.746)
unemp	-0.015 (0.123)
_cons	36.369 (5.483)

So, Income Inequality = 36.369 + 0.014 GNE + 0.025 GDP – 1.228 PS – 0.015 Unemp Here, the output is consisted of four essential sectors of facts:

- a. The R2 ("R-squared") value shows the amount of variation in the dependent variable that is explained by the variation of independent variables.
- b. Adjusted R2 (Adj. R- Squared) is almost similar to R-squared but the difference is that it is accustomed by the amount of cases and also the amount of variance. Adj R2 is closer to R2 when the quantity of variable is minor and the quantity of cases is very huge.
- c. The F value (F(4, 132)) indicates the overall significance of the model.

d. The coefficient for the constants and the variable which is independent is the stake of evidence that we requisite to forecast the dependent variable using the independent variable.

Here, in our model, R Squared, $R^2 = 0.024$. Usually we need a p value which is lower than 0.05, which represents analytically substantial connection between X and Y. As our p value is 0.527 which is not lower than 0.05, so the regression model is not statistically significant. Furthermore, there is a positive relationship between gdp and coef., gne and coef., cons and coef., and on the other hand there is inverse relationship between ps and coef., unemp and coef.

***Pair Wise Correlation:**

	gini	gne	ps	gdp	unemp
gini	1.000				
gne	0.0475	-1.000			
ps	-0.1627	-0.1582	1.000		
gdp	-0.0082	-0.0500	0.0340	1.000	
unemp	-0.0101	-0.0598	-0.0253	-0.1606	1.000

Here, we have presented all the variables of a correlation matrix in the model. The given numbers are Pearson correlation coefficients which indicates nearer to 1 implies robust correlation. Also a adverse value specifies the affiliation which is inverse.

Here, the gdp has the negative relationship (-0.0082) with the gini which indicates that when GDP per capita growth increases the income inequality decreases. Also, the political stability has the negative relationship with the income inequality (-0.1627) which indicates that if the political stability increases then the income inequality decreases. Unemployment and the income inequality also has the same relationship between them (-0.0101), that means income inequality increases when the unemployment rate decreases.

Finally, the gne has the positive (0.0475) connection with the income inequality.

*Diagnostic Test

Heteroscedasticity:

Simply, heteroscedasticity refers to the set of conditions where the variability of the variable is not equal across the area of values of a second variable that predicts it. There is a non graphical way to detect heteroscedasticity which is known as Breusch-Pagan test. The null hypothesis is that residuals which are homoscedastic.

Here, we will do Breusch-Pagan test. This test will suggest us the possible presence of heteroscedasticity in our model.

$$\text{chi2}(1) = 0.53$$

$$\text{Prob} > \text{chi2} = 0.4670$$

Ho : Homoscedasticity Ha :

Heteroscedasticity

If $P < 0.05$ then reject Ho.

As $P = 0.4670$ which is greater than 0.05.

Here, we can not reject Ho which means homoscedasticity.

So, there is homoscedasticity in our model.

Omitted Variable Test

In statistics, omitted variable bias refers to the situation when one or more than one variables are left out from the statistical model.

The Ramsey Regression Equation Specification Error Test (RESET) test is a universal measurement test which is tested for the linear regression model. Here we are going to do Ramsey RESET test to detect if there is any bias variable.

$$F(3, 129) = 0.91$$

$$\text{Prob} > F = 0.4397$$

If $P < 0.05$ then reject H_0 .

H_0 : model has no omitted variables

H_a : has omitted variables

As $P = 0.4391 > 0.05$ So we can not reject H_0 .

So, the model has no omitted variables.

***Multicollinearity Test:**

Multicollinearity is the phenomenon when the independent variables of a regression model are related to each other which means they are correlated. This correlation is a problem because the independent variables must be independent, no other option. It is kind a problem in data, if it is found statistically then the data will not be authentic.

Multicollinearity occurs because of certain reasons:

1. Because of an inaccurate use of dummy variables.
2. Normally occurs when the variables are correlated in a very high rate etc.

Problems occur because of multicollinearity:

1. Because of multicollinearity, the partial regression coefficient may not be calculated promptly.
2. There occurs change in signs as well as in the magnitudes of partial regression coefficients from one sample to another.

Here, we will test if our model has any multicollinearity.

Variable	VIF	1/VIF
gne	1.07	0.937
ps	1.06	0.946
dgp	1.03	0.967
unemp	1.03	0.967
Mean VIF	1.05	

VIF (Variable Inflation Factor) is used to check the multicollinearity.

A $vif > 10$ or a $1/vif < 0.10$: it designates trouble in the model.

So if the VIF is less than 10 or 1/VIF is less than 0.10 then it represents multicollinearity in our model.

Here, all the VIF if less than 10 which indicates no multicollinearity.

So there is no multicollinearity in our model.

Findings:

After analyzing our model we have found exceptional outcomes, explained below:

1.As we have reviewed many papers so we have seen that the GDP per capita growth has a negative relation with Gini Index. That means, the normal scenario is, when the GDP increases the income inequality decreases. But here we have found, a positive connection between GDP and Income Inequality.

Now we can explain this matter by giving an example of India. We know that, in India the GDP growth is too high and also their absolute poverty is too high. That means this scenario proves that, it can be happened that the income inequality increases while the GDP is also increasing. Furthermore, there might be another reason like, any government policy or an economic system where the GDP is increasing but the biggest share part is going in the hand of rich people and a very little amount is receiving by the poor people.

So, there can be a positive connection amongst GDP and Income Inequality.

2.Another matter we have found that, the connection amongst Unemployment and Income Inequality is negative, which is an exceptional case. Mostly in other papers we have seen that there is a positive connection amongst these two.

Here, we can explain our case in a different way. The skill level of a person can play the vital role in this scenario. Simply, we can say, the persons who are skilled are getting better jobs or better activities than the unskilled people. We have seen that, most of the skilled people belong from a good family, on the other hand, the unskilled people are belonged from the poor family. So most of the educated and skilled people are doing jobs with a high salary but the poor and unskilled people are working but they do not get much salary. So, it can be said that, though the unemployment rate is decreasing but the income inequality is still increasing.

***Policy Recommendation:**

As we have found different findings from our model. According to the findings the policies are given below:

1.As we have found that, income inequality increases while GDP is increasing. That means, the benefits of GDP is not distributed equally amongst the people. So the government should take the necessary steps to ensure equal distribution.

2.Also we have found an inverse connection amongst unemployment and income inequality. In this case, the employment sector should be more careful so that the unskilled labor also get better employment. The government intervention should be taken so that poor and rich both are getting opportunities and facilities to do work. For example we can say, a rickshaw puller should also have all the scopes or opportunities so that s/he can come to the skilled labor force. So, government intervention is very important for this sector.

***Conclusion:**

Economic growth plays a dynamic role in every country of the world. There can be a positive also a negative impact of economic growth over income inequality. The world consists of 195 countries and we have analyzed 144 countries. It can be seen that, economic growth differs in connecting with income inequality of different countries. According to our topic, most authors have conducted time series and panel data analysis. But after our cross sectional analysis we got that, there may be exceptional cases with different findings. In the world, the population plays one of the most important roles to analyze any model. Because without the labor force, income inequality can not be measured. Also, the government plays imperative role to handle different cases of the country.

Finally, the impact of economic growth on income inequality may vary country to country.

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Appendix:

List of the countries:

List Of the Countries					
Asian Countries	African Countries	European Counties	North American Countries	South American Countries	Australia and Oceania
Armenia, Azerbaijan Bangladesh, Bhutan China, Eswatini, Ethiopia India, Indonesia, Iran, Israel, Iraq Japan, Jordan, Korea, Kyrgyz Republic, Lao PDR, Malaysia, Mongolia, Nepal, Pakistan, Sri Lanka, Syrian Arab Republic, Tajikistan, Thailand, Uzbekistan, Vietnam, West Bank and Gaza, Yemen	Algeria, Angola Benin, Botswana, Burkina Faso, Burundi Cabo Verde, Cameroon, Central African Republic, Chad, , Comoros, Congo, Cote d'Ivoire Djibouti Egypt Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Seychelles, Sierra Leone, South Africa, South Sudan, Tanzania, Togo, Tunisia, Uganda, Zambia	Albania, Austria Belarus, Belgium, Bosnia Herzegovina, Bulgaria Croatia, Cyprus, Czech Republic Denmark Estonia Finland, France Georgia, Germany, Greece Hungary Iceland, Ireland, Italy Kazakhstan, Kosovo, Latvia, Lithuania, Luxembourg, Macedonia, Malta, Moldova, Montenegro, Netherlands, Norway, Portugal, Romania, Russian Federation, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom	Belize, Canada, Costa Rica Dominican Republic El Salvador Guatemala Honduras Jamaica, Mexico, Nicaragua, Panama, United States	Argentina Bolivia, Brazil Chile, Colombia Ecuador, Paraguay, Peru, Uruguay, Venezuela	Australia, Fiji, Kiribati, Papua new guinea, Solomon Iceland, Timor-Leste, Vanuatu

Basic Table of Data Analysis:

Variables	Observations	Mean	Standard Deviation	Minimum	Maximum
Gini	144	38.18	8.13	17.4	63
gne	144	107.70	16.44	64.90	202.33
ps	144	-.176	0.94	-2.92	1.42
gdp	144	1.55	3.18	-16.29	12.10
unemp	137	7.66	5.70	0.35	26.55