

# **A Panel Data Analysis on Globalization and Income Inequality**

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## **Abstract:**

The paper investigates the relationship between globalization and income inequality using a comprehensive set of variables. It uses a panel data analysis of 51 countries over the time period of 2000-2013. The independent variables included are globalization, economic growth, education, economic freedom, and urbanization. Overall, the results suggest that globalization, as well as economic freedom and urbanization, have a significant impact on income inequality within developing nations. However, they differ in their effect on income inequality. Globalization is shown to decrease income inequality while economic freedom and urbanization in turn widen the income distribution gap. Meanwhile, results also suggest that developed countries derive their income disparities from elsewhere.

JEL Classification: F6

Keywords: Globalization, Income Inequality, Urbanization, Economic Freedom

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## **Introduction**

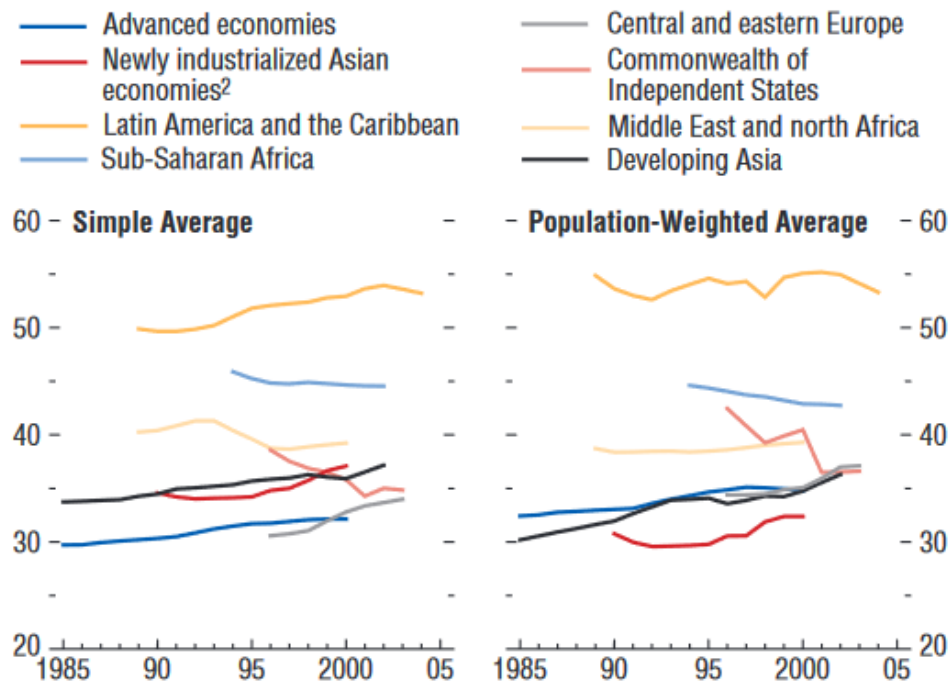
The relationship between globalization and income inequality is becoming an increasingly important topic as countries around the globe experience the effects of a “smaller” world. Globalization is the process of interaction and integration among different countries that is driven by international trade, investment and further aided by information technology. It can be defined by various aspects not only in respect to economic activity, but also political, technological, and cultural interactions. Through this process, economies are becoming closer and more interrelated the more they interact. This in turn is supposed to promote global economic growth, however there is the belief that this growth comes at the expense of increased income inequality within countries. This panel data analysis hypothesizes that this notion is true, that as countries become more globalized, income inequality within countries increase as well.

The main concern of the relationship between globalization and income inequality is primarily focused on developing countries. Marjit et. al (2004) discovered that the impact of globalization on income distribution is vastly different between developed and developing nations. Globalization has far less drastic consequences on income inequality in developed nations than developing nations. In addition to the differences between North and South, Atif and Srivastav (2012) also found evidence that these differences in income distribution due to globalization might also be caused by structures and institutions that are in place in each country. This study recognizes the divide between the global north and the global south while also implementing criteria that embodies a country’s economic structure and financial institutions. However, this notion that globalization has a positive relationship with income inequality conflicts with the findings of Zhou et. al (2006), where they believe they have evidence that supports the claim that globalization reduces income distribution inequality within a country.

## Trend

According to the International Monetary Fund, world trade has grown five times in real terms since 1980 while its share of world GDP has risen from 36 percent to 55 percent over the same period. This acceleration can be contributed to former Eastern bloc countries becoming more integrated as well as the development of Asia becoming more open to trade. Additionally, financial globalization has also seen rapid growth since in the 1980s. The IMF reports that total cross-border financial assets have more than doubled, from 58 percent of global GDP in 1990 to 131 percent in 2004. Meanwhile, the Gini coefficient, a measure of inequality where a higher coefficient represents greater inequality, has risen in certain areas across the globe as shown in Figure 1.

**Figure 1: Average of Country Gini Coefficients by Region**



\*Source: International Monetary Fund

## Literature Review

Atif and Srivastav (2012) conducted a panel data analysis of 68 countries over the period of 1990-2010 to discern the relationship between globalization and income inequality. Their

results suggest that increases in globalization in developing countries leads to an increase in the level of income inequality. Their model uses the GINI coefficient as their independent variable while their dependent variables include the KOF Index of globalization, education levels, and urbanization. However, while this analysis supports the notion that globalization causes income inequality, it does suffer from limitations. Firstly, Afit and Syriyastav (2012) note that there are inherent limitations in the source data. And secondly, they make no distinction between developed and developing nations.

Asteriou et. al (2014) investigated the relationship between income inequality and globalization by focusing on both trade and financial variables. They conducted a panel data analysis for the EU-27 countries from the years 1995 to 2009. Their results suggest that while trade openness applies an equalizing force, financial globalization by the means of FDI, capital account openness and stock market capitalization has been one of the main driving forces of inequality during the period studied. However, they also note that even though trade impact remained robust, there were disparities in the financial globalization effects within a certain group or among country groups. This disparity is especially apparent with the significant increase in inequality among peripheral or new member states.

Zhou et. al (2006) propose a different view from the previous literature. In their study of whether globalization affects income inequality within countries, their results suggest that globalization has a beneficial effect on the income distribution within a country. In conducting their analysis they created two globalization indices using Kearney (2002, 2003, 2004) data and the principal component analysis. These indices are averages of the 15 determinant variables included in the Kearny data set. Their dependent variable, the GINI coefficient is regressed against the indices respectively. Their analysis includes data from 60 countries over the periods

of 1996-2001. They conclude that income disparity will not be further widened by becoming more integrated into the global economy.

### Data

The effect of globalization on income inequality will be investigated by a panel data analysis of 51 countries over the time period of 2000-2013. Within this group of countries, there are 29 from Europe, 8 from the Middle East/Eurasia region, and 11 countries from South America. Furthermore, 29 of them are considered developing and 22 are considered developed according to the International Monetary Fund.

**Table 1: Variable Description**

	Variable	Description	Source
Income Inequality	GINI	Index of the measurement of inequality among values of a frequency distribution	World Bank
Globalization	KOF	Index of economic, social, and political globalization	Swiss Economic Institute
Economic Growth	GDP	Gross Domestic Product growth (annual %)	World Bank
Education	EDU	Gross enrolment ratio, tertiary education (%)	World Bank
Economic Freedom	FREE	Index that covers 10 freedoms	Heritage
Urbanization	URB	Urban population growth (annual %)	World Bank

### Model

$$\text{Income Inequality} = \beta_0 + \beta_1 \text{ Globalization} + \beta_2 \text{ Economic Growth} + \beta_3 \text{ Education} + \beta_4 \text{ Urbanization} + \beta_5 \text{ Economic Freedom} + u_i$$

The population model includes five independent variables that are summarized in Table 1. Income inequality, the dependent variable, is measured by the Gini index provided by the World Bank. This index measures the extent to which the distribution of income among individuals or households within an economy deviates from a perfectly equal distribution (World Bank). This index is measured from 0 to 100, where 0 represents perfect equality and 100

implies perfect inequality. Thus, if an independent variable has a negative coefficient in the regression, it is helping to reduce income inequality.

The first independent variable is globalization as represented by the KOF index. This index is comprised of three differently weighted components: economic globalization, social globalization, and political globalization. The weights of which are 36%, 37%, and 27% respectively. The economic component is then further divided into two parts. First is actual flows, which include trade, FDI, portfolio investment etc., all as a percent of GDP. The second economic part is restrictions such as hidden import barriers or mean tariff rate. Social globalization is separated into three sections. There's data on personal contact, such as telephone traffic and international tourism. Another section is data on information flows, such as internet users per 1000 people. The last section is data on cultural proximity, which one measurement is number of McDonald's Restaurants. Finally, the last component of the index, social globalization, is not divided into parts like the former two and involves the likes of the number of embassies in a country or membership in international organizations. As the hypothesis states, the predicted sign of this variable's coefficient is positive, as the more integrated into the global economy a country becomes, the wider the income inequality will be and the higher the Gini index.

Economic growth is measured by GDP growth as an annual percentage. If the null hypothesis holds true, then the more globalized a country becomes, the more growth they will experience in their GDP reducing income inequality as the economy grows as a whole. There are many factors that contribute to annual GDP growth, so it is predicted that this sign could go either way and that the variable itself will probably not be as significant as other variables.

Education is measured by the gross enrolment ratio for tertiary schooling. It is the total enrollment in tertiary education expressed as a percentage of the total population of the five-year age group following on from secondary schooling. In summary, the amount of college-aged peoples actually enrolled in college. The expected sign for this variable is negative based on the assumption that as more people become educated at a higher level, they will attain higher-paying jobs reducing income inequality.

Economic freedom is represented by the Freedom Index from The Heritage Foundation. It encompasses 10 freedoms such as property rights, fiscal freedom, or freedom from corruption. As countries become more globalized, they innately become more liberalized in order to conduct business in abroad or to have business come to them. Thus the predicted sign would be positive, as the more economic freedom a country experiences, the wider the income inequality gap becomes. The economy no longer has walls that would've protected the less fortunate who will suffer the negative externalities of becoming more "free", such an example would be dumping. This effect will have a more drastic effect on developing countries than developed, as the developed countries already have an established foothold in the global economy to protect its interests.

Urbanization is measured by population growth as an annual percentage. The notion behind the inclusion of urbanization is that as countries become more globalized, they become more industrialized, which moves residency from rural to urban as employment becomes available. Due to this, the predicted sign for this variable is positive, as the country becomes more urbanized, that infers that it's becoming more globalized, which according to the hypothesis, would increase the income distribution gap.

## Results

**Table 2: Simple Linear Regression – All Countries**

Variable	Coefficient	Robust Standard Error
KOF	-0.3717491*** (-10.8)	0.0344322
GDP	-0.0547338 (-0.74)	0.0737907
EDU	-0.0740456*** (-3.69)	0.0200428
FREE	0.1785658*** (4.09)	0.043634
URB	2.980894*** (10.42)	0.2860629

R-Squared = 0.5339 F-Stat = 0.000

\*, \*\*, \*\*\* denotes significance at the 10%, 5%, and 1% levels respectively.

**Table 3: Fixed Effects Regression – All Countries**

Variable	Coefficient	Robust Standard Error
KOF	-0.1471753** (-2.55)	0.0576166
GDP	0.0286706 (1.09)	0.0263209
EDU	-0.0359935 (-1.26)	0.0285274
FREE	0.1794481** (2.67)	0.0672176
URB	0.2686731 (0.74)	0.3646094

F-Stat = 0.0145

\*, \*\*, \*\*\* denotes significance at the 10%, 5%, and 1% levels respectively.

**Table 4: Random Effects Regression – All Countries**

Variable	Coefficient	Robust Standard Error
KOF	-0.2027926*** (-3.93)	0.0516183
GDP	0.0243891 (0.94)	0.0260416
EDU	-0.0347694 (-1.26)	0.0276686
FREE	0.1776783*** (2.83)	0.0627577
URB	0.6345482* (1.72)	0.3687651

\*, \*\*, \*\*\* denotes significance at the 10%, 5%, and 1% levels respectively.



After running a simple linear regression, the hypothesis that stated that an increase in globalization would widen income inequality turned out to be wrong. However, globalization does have a significant impact, just not in the direction as predicted. Significant at the 1% level, the KOF variable has a negative coefficient of (-0.371749). While the magnitude may be small (the change is equal to the difference of Italy and Poland), what's more important is the negative sign that indicates that as globalization increases, the Gini index would decrease, thus meaning that it helps decreasing income inequality. This would uphold in both fixed effects and random effects regressions, where the significance is at the 5% level for both with associated coefficients of (-0.1471753) and (-0.2027926) respectively.

Furthermore, economic freedom also remains significant across all regressions as well, posting at the 1% level for the robust regression then at the 5% level for fixed and random effects regressions. The coefficients for all regressions are around 0.17. Again, while the magnitude is relatively small, the implication of the sign with the level of significance is crucial. With a positive sign, the results suggest that as countries become freer economically, the income inequality gap widens. Thus it would infer that as economic freedom increases – widening the income distribution disparity – either the resulting increase in globalization or the existing rate of globalization drives the gap closer holding other variables constant.

Meanwhile, only one variable, GDP growth, was found to be insignificant across all regressions. Both the remaining variables, education and urbanization, were found to be significant at the 1% level in the simple regression, however they both lose their integrity as they become insignificant in the fixed effects and random effects regressions.

**Table 4: Fixed Effects Regression – Developed Countries**

Variable	Coefficient	Robust Standard Error
KOF	-0.0438811 (-0.38)	0.1160767
GDP	0.0335658 (1.16)	0.0290026
EDU	-0.0024218 (-0.06)	0.0399131
FREE	0.0268559 (0.32)	0.0831159
URB	-0.2519692 (-0.43)	0.58511

F-Stat = 0.8034

\*, \*\*, \*\*\* denotes significance at the 10%, 5%, and 1% levels respectively.

**Table 5: Fixed Effects Regression – Developing Countries**

Variable	Coefficient	Robust Standard Error
KOF	-0.1825735*** (-2.93)	0.0622906
GDP	0.0530954 (1.44)	0.0368054
EDU	-0.0550007 (-1.68)	0.0326666
FREE	0.2134953*** (2.98)	0.0717144
URB	1.229441** (2.58)	0.4762194

F-Stat = 0.0001

\*, \*\*, \*\*\* denotes significance at the 10%, 5%, and 1% levels respectively.

Additionally, those results are from the consolidated data set of countries. When grouped into developed countries and developing countries, more insight is offered on the relationship between globalization and income inequality. The developed group differs drastically from both the consolidated results and the developing results. The developed country analysis shows that no variables in either the fixed effects or random effects regressions are significant. In fact, the R-squared in the simple regression drops down to low 0.1238 from a figure of 0.5339 in the consolidated regression. Furthermore, urbanization attains a negative coefficient where before it was positive, however it is insignificant at all levels.

While variables lose their significance in developed countries, the exact opposite happens in developing countries. KOF index becomes significant at the 1% levels in fixed effects and random effects with coefficients of (-0.1825735) and (-0.1907579) respectively. Economic freedom too raises to the 1% level in both regressions with coefficients of 0.2134953 with fixed effects and 0.2167016 with random effects. Urbanization becomes significant at the 5% level in the fixed effects regression with a coefficient of 1.22944 and at the 1% level in the random effects regression with a coefficient of 1.671033. Education, while significant at the 10% level in the random effects model, is insignificant with fixed effects. GDP growth remains insignificant in all models.

Nonetheless, there is a distinct difference between developed and developing countries and where they derive their changes in income inequality from. This can be clearly seen from their associated R-squared figures from their linear regressions, where developed countries are at a lowly 0.1238 and developing countries remain high at a 0.5441. Clearly, developing countries were the main driving force of the results attained in the consolidated regression. As both globalization and economic freedom were significant in the first regressions, then became even more so when developed nations were split off. In relation, one of the major differences between developed and developing countries centers on urbanization. While significant at the only 10% level in the random effect model of the consolidated countries with a positive coefficient, this variable goes through a transformation when the countries were divided. Not significant in any of the developed regressions, its coefficient also becomes negative. Meanwhile it gains significance in all of the developing regressions, the least being 5% in fixed effects. Additionally, it sports the highest coefficients in all the regressions as well, reinforcing its effect on income inequality.

Summary statistics and correlation tables for the different regressions can be found in the appendix.

### **Conclusion**

In summary, the results show that when grouped as a whole, globalization and economic freedom are significant with differing effects on income inequality, where globalization decreases the gap while economic freedom forces the gap to widen. However, developing nations and their associated income distributions clearly were more effected by the independent variables than developed nations were. The developed countries had no significant variables when regressed on their own while developing countries had significance on globalization, economic freedom, and urbanization when regressed on their own. In developing countries, globalization is shown to lower income inequality while economic freedom and urbanization seem to increase the income distribution disparity.

The relationship between globalization and income inequality is a topic of significant interest, especially as countries become more and more integrated into the global economy. Various studies have produced different results. While the results of this study differ from the predicted hypothesis, it is no less supported by previous research done. Zhou et. al (2006) also found that globalization has a beneficial effect on income inequality. Furthermore, both Zhou et al (2006) and Atif and Srivastav (2012) found similar evidence of the clear difference of the various factors that effect income disparity within developed and developing countries.

However, the study done here does suffer from several limitations. Firstly, is that data is only available for a select amount of countries. Most of the developed nations that had all the data required are situated in Europe, which means there may be a biased towards European nations as it excludes different regions of developed nations due to data. Similarly, the developing nations group only has countries from South America, Middle East/Eurasia and

Europe. Another limitation to consider pertains to the KOF index and how it weighs FDI. Both Asteriou et. al (2014) and Bhandari and Bornali (2007) found evidence that FDI has a significant impact on income inequality when tested as a singular variable. This suggests that FDI should be weighed more heavily, yet the KOF index only has it weighed at 13.5% of its economic globalization component which itself only accounts for 36% of the index. To avoid correlation issues, FDI as a variable was excluded.

Nonetheless, the study still shows that developing nations benefit from globalization in terms of income inequality, but are hindered by increasing economic freedom and urbanization. Meanwhile, developed nations derive their income disparities from variables elsewhere. From the results, it can be determined that developing nations must balance the integration of themselves into the global economy with how much economic freedom can offer. As it becomes more developed, the significance of the balance of the two seems to drop off as results from the developed countries show. This implies that developing countries who are establishing a foothold in the world economy, must protect the integrity of the government in its internal economic affairs. While these countries start to converge to developed levels, they can gradually introduce more economic freedom.

## Appendix A – Consolidated Countries

### Summary Statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
GINI	576	37.95868	9.882998	23.72	63
KOF	663	70.14177	13.14606	43.68542	92.37168
GDP	713	3.469797	4.1079	-14.8142	14.0408
EDU	609	55.32013	19.12003	9.81434	110.2631
FREE	700	64.11843	8.356038	38	82.6
URB	714	0.917833	1.216679	-2.38589	4.837999

### Correlation Table

Variables	GINI	KOF	GDP	EDU	FREE	URB
GINI	1					
KOF	-0.528	1				
GDP	0.1291	-0.321	1			
EDU	-0.5446	0.4977	-0.2043	1		
FREE	-0.0852	0.5512	-0.1966	0.0542	1	
URB	0.4821	-0.0423	-0.0369	-0.3599	0.1193	1

## Appendix B – Developed Countries

### Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
GINI	210	31.15648	3.633208	23.72	39.4
KOF	286	82.2199	7.229593	58.6301	92.37168
GDPG	308	2.170896	3.896463	-14.8142	11.90219
EDU	298	64.13108	17.34517	9.81434	110.2631
FREE	308	69.51006	6.446785	53.3	82.6
URBG	308	0.634974	0.9848749	-2.38589	3.339308

### Correlation Table

Variables	GINI	KOF	GDP	EDU	FREE	URB
GINI	1					
KOF	-0.3084	1				
GDP	0.0178	-0.1981	1			
EDU	-0.0801	-0.163	-0.1773	1		
FREE	0.0064	0.2698	0.042	-0.2308	1	
URB	-0.1638	0.5765	-0.1161	-0.2819	0.1816	1

## Appendix C – Developing Countries

### Summary Statistics

Variable	Observations	Mean	Std. Dev.	Min	Max
GINI	366	41.86158	10.21839	24.55	63
KOF	377	60.97906	8.337441	43.68542	86.82975
GDPG	405	4.457603	3.992277	-14.8	14.0408
EDU	311	46.87748	16.81147	13.81765	91.02977
FREE	392	59.88214	7.162515	38	76.3
URBG	406	1.132416	1.328081	-1.96698	4.837999

### Correlation Table

Variables	GINI	KOF	GDP	EDU	FREE	URB
GINI	1					
KOF	-0.2533	1				
GDP	-0.0002	-0.219	1			
EDU	-0.4975	0.3705	-0.0243	1		
FREE	0.3639	0.209	-0.1474	-0.4082	1	
URB	0.6676	-0.1459	-0.046	-0.3815	0.2661	1

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