EFFECT OF MINIMUM WAGE ON INCOME INEQUALITY (2020)

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ABSTRACT

Minimum wage is one of the most studied topics in economics. In this paper we aim to achieve its effect on income inequality, which is also one of the rising issues in many developing countries. Recent research studies have shown a steady increase in income inequality. An increase in minimum wage would help those in the lower end of the income distribution spectrum, thus reducing income inequality. We form an econometric model to account for many factors that affect income inequality including GDP per capita. We determine the relationship and conclude with policy recommendations for the future.

INTRODUCTION

'An imbalance between rich and poor is the oldest and most fatal ailment of all republics'
Plutarch

According to OECD (Organization for Economic Co-operation and Development), Income Inequality is defined as a measure that highlights the gap between different individuals' or households' disposable income at a particular time period. In 1820 the ratio of the income distribution between the top percentile and bottom 20 percentile of the world's population was three to one. By 1961, it had shown a drastic increase jumping to eighty-six is to one. In 2012, the richest 10 percentile had control over 90 percent of the total household wealth and the wealthiest 1 held 18 percent compared to only a mere 30 percent held by the lowest 40 percentile. Minimum wage refers to the lowest remuneration that the employer is bound to pay the employee. It acts like a floor price below which the employee may choose to not sell their labour. Empirical research and studies on minimum wages is usually related to unemployment and is not generally perceived to be concerned with income inequality. However, in Germany a popular debate for federal minimum wages is that it will reduce income inequality and prevent in-work poverty.In this paper we assert this discussion closely and look at these two economic trends and how they effect each other. The central theme of this paper is to discuss the impact of an increase in minimum wage on the level of income inequality. Does an increase in the minimum wage lead to a decrease in income inequality? How does a decrease in income equality affect the growth of an economy? What happens to income inequality with an increase in the population level? Does an increase in consumption or savings impact income inequality? Is there a significant relationship between income of the top 10 percentile of income owners and income inequality? -
These are some of the questions which will be answered in the due course of this paper.
Due to lack of data, we will be using median household income as a proxy variable for minimum wage level in the mathematical model. Income equality in the data set has been measured in terms of Gini Index.

LITERATURE REVIEWS

Effects of Raising Minimum Wage: Theory, Evidence, and Future Challenges

Silvia Marginean, Alina Stefania Chenic(Cretu)

The minimum wage is one of the most studied topics in economics. This paper examines some of the most important issues related to the effects of raising the minimum wage. The authors show that since the minimum wage has fallen in real terms (in the US) the increase directly affects a smaller number of low wage workers thereby having a small effect on the unemployment level. They do observe a substantial increase in the minimum wage elasticity for teenagers. Generally, the minimum wage is studied for industries that pay their workers at or very close to minimum wage levels for example the fast-food and retail sector. Minimum wage is often related to a problem of the developing countries like Nicaragua, Brazil, Chile, Columbia, Costa Rica, South Africa. The case of Nicaragua stands out as the country has relatively high minimum wage levels compared to the average, thereby affecting a large proportion of the population and causing workers to leave covered sectors. This will reduce the number of new hires. Therefore, the probability of a family moving out of poverty is increased due to the minimum wage. The authors have also studied the appropriate time or when should the minimum wage be increased or be introduced. There is also a set of people who would debate this idea of introducing a minimum wage. This debate is triggered by the introduction of a minimum wage in Germany in the 1990s. They argue that introducing/raising the minimum wage would raise the unemployment levels, as the employers will only hire up to the point where the minimum wages will equal the marginal products. Flaschel & Griener (2009), shows that the introduction of minimum wages will be a better idea when the economy is in the prosperity phase than in the depressed or stagnant phase. Therefore it can be said that when the unemployment rate is low, there are low effects of raising the minimum wage. It can be concluded that a raise in minimum wage does not have a significant effect on employment and unemployment levels but it does have a dramatic effect on poverty alleviation (as in the case of Nicaragua).

The Effects of Minimum Wage on Earnings Inequality: Evidence from China

Carl Lin Bucknell University, IZA and China Institute for Income Distribution
Myeong-Su Yun, Inta University and IZA

The authors look into whether the increasing minimum wage has led to a fall in income inequality. They take the specific example of China. China introduced new minimum wage regulations in 2004 after which the frequency and magnitude of changes in the minimum wage have been substantial. The Chinese economy has been growing remarkably at 9.8% per year, after the 1978 reforms. This has also led to an increase in the earnings of the Chinese workers over the same period. According to the National Bureau of Statistics of China (NBS), there has been a significant increase in disposable earnings—more than 70 fold—in urban China over the past few decades, leading to a rise from 343 RMB in 1978 to 24,565 RMB in 2012. The numbers are lower in rural China, but the growth here as well has been high, increasing by 60 fold from 134 RMB in 1978 to 7,917 RMB in 2012.

The rapid increase in the Chinese economy has, however, led to disoriented income distribution. The urban-to-rural earnings per capital ratio increased from 2.57 in 1978 to 2.90 in 2001 and further to 3.10 in 2012. Gini Coefficient (commonly used measure for calculating income inequality) has risen from 0.16 and 0.22 in 1978 for urban and rural areas respectively to an overall Gini coefficient of 0.376 in 1988 to 0.439 in 1995 and further to 0.454 and 0.490 in 2002 and 2007. High-income inequality countries like Brazil and Mexico have however shown a decline in Gini coefficient values over time. The growing gap between the rich and the poor has engendered challenges to the economic growth and social stability of China. There have been various policy actions taken by the Chinese Government such as aid to the poor, rural minimum social security, and the minimum wage policy. Among these, the minimum wage policy has been the most controversial. The authors use a large set of panel data that has all the information relating to minimum wage, along with a longitudinal household survey of 16 representative provinces. This is used to find the distributional effect of minimum wage changes in China over the period 2004-09. These results indicate that an increase of minimum wage causes a significant decline in the income gap for the bottom end of the distribution. To support the observations they also calculate the value of counterfactual changes in earnings differentials and then decompose the total change in China's total income distribution. Similarly, the Gini coefficient results and variance conclude that minimum wage helps to reduce income/earnings inequality.

Understanding How Raising the Federal Minimum Wage Affects Income Inequality and Economic Growth

This paper examines how raising the minimum wage helps in combating poverty and helps in boosting the economy more generally. The economics evidence shows that raising the minimum wage does not lead to higher unemployment overall but rather boosts productivity and addresses a growing issue in the economy of rising inequality.

Careful studies of the economics literature find that increases in the minimum wage have little to no effect on employment. Economists have looked at the effects of a minimum wage hike in New Jersey by comparing fast food restaurant employment in the state to fast food employment in Pennsylvania which did not increase its minimum wage. They found that the increase in the minimum wage did not reduce employment.

The reason behind employment remaining nearly constant even after raising the minimum wage is that higher wages can help workers become more productive and therefore more valuable to their employer. Economists have termed this efficiency wages theory.

Economists have found that higher wages boost productivity, increase morale, reduce costs, and improve efficiency. It has been found that there are efficiency gains resulting from increase in minimum wage. In a 2011 , economists examined the effect of a federal increase in the minimum wage on 81 restaurants in Georgia and Alabama. In their survey, managers reported that they could identify possible non-wage savings and productivity improvements in response to the minimum-wage regulations. It is possible that lower costs stemming from these changes could outweigh the costs of paying a higher minimum wage.

In addition, it's possible that a higher minimum wage could make staying in one's job more attractive and thus reduce turnover costs. A 2013 working paper finds that a higher minimum wage leads to fewer 'hires and separations', or worker turnover.

Finally, the level of the minimum wage has a considerable effect on the distribution of wages in the United States. Economists have found that the declining inflation-adjusted value of the minimum wage had a considerable effect on wage inequality for those workers in the bottom half of the wage distribution. A 1996 paper found that the decrease in the minimum wage from 1979 to 1988 had a considerable effect on the wage distribution. They found the decline in the minimum wage explained up to a fourth of increasing wage inequality for men and up to three-tenths of increase wage inequality for women.

In more recent work , it was found that about 75 percent of the increase in low-end inequality from 1979 to 1991 is due to the decline in the value of the minimum wage, but the decline only explains 45 percent of the increase from 1979 to 2009.

Although the exact magnitude of the effect of minimum wage on income inequality is not known, it is known that a rise in minimum wage was a significant factor in the increase in inequality for the lower half of the income distribution.

Determining the Effect of Minimum Wage on Income Inequality

Benjamin S. Litwin & Gettysburg College

This paper focuses on the relationship between the minimum wages and income inequality in nations that are members of the Organization for Economic Co-operation and Development (OECD). Throughout these developed nations, the federally mandated minimum wage varies relative to the median hourly earnings, from Hungary, which in 2010 had a minimum wage equal to 21% of the median hourly earnings, to France, which in the same year had a minimum wage equal to 61% of the median hourly earnings.Since minimum wage laws raise the wages for workers at the low end of the income spectrum, this variance would suggest that changes in the minimum wage throughout different nations alters income inequality. This association is explained mainly using the theories: redistribution theory, where the minimum wage takes money from other parts of the economy and gives it to the low-income workers, and the marginal productivity theory of wage inequality, where the minimum wage raises the wages of low-skilled workers, thereby altering the labor markets for low-skilled and lowest-skilled workers.

There is a growing concern to control
income inequality. Since 1979, the wealthiest 0.1 percent of Americans have received 20 percent of all increases in incomes.This signals a massive growth in the economy for a small number of people, while the majority of the population is suffering from very little, if any, growth in their incomes. By studying the effect of policies such as the minimum wage on income inequality, this paper provides policy analysis on a program designed to help grow the incomes of the low-end of the distribution and possibly provide suggestions for improving the policy. This will lead to economic growth for those struggling the most in the current economy, and improve their quality of life.

A main importance of the research paper is that it will be focusing on countries within the OECD. The reason for this is that all of the countries within this group are considered developed nations and therefore changes to

economic policies affect them in similar ways. This will therefore provide significant policy implications, since it will be clear how changes to labor laws affect the macroeconomy by comparing many countries that have similar economies. This will help in showing how well certain countries are handling the issue of inequality by adjusting their minimum wages. Overall, the study of OECD nations will help analyse how developed economies are affected by changes in the minimum wage and allow us to provide policy suggestions pertaining to it.
This paper will empirically address the question of how varying minimum wage across OECD nations affect income inequality. Section II will further develop the theories connecting the minimum wage to income inequality and review previous empirical work testing this relationship.

ECONOMIC THEORY

This paper aims at studying the effect of minimum wage on income inequality. Freeman presented the redistribution theory which can be used to study the relationship between minimum wage and income inequality. It discusses how the minimum wage shifts the earning distribution towards the lower end through two mechanisms. The first mechanism is the consumers of products made by minimum wage employees. The minimum
wage increases the cost of production of these goods and services, which in turn increases their prices. Therefore the wage of the low-wage workers is increasing while the purchasing power of other people's income decrease, thereby leading to higher equality. The corporations that hire minimum wage workers are the second mechanism used in the redistribution theory, specifically through the stakeholders. By increasing the wages of the workers, profits decrease due to the increased cost of production. Lowered profits thereby decreases the income of the stakeholders, usually at the higher end of the wage distribution, while the increased minimum wage raises the incomes of the low wage workers. These mechanisms show the relationship between the minimum wage and income inequality through redistribution.

The marginal productivity theory of wage inequality can also be used to explain this relationship. It states that wage disparity is caused by disparities in skill level. Higher skilled people have higher wages while lower skilled people have lower wages. The connection between the minimum wage and inequality using the marginal productivity theory relies on there being three separate levels of ability, high ability, low ability, and lowest ability. The low ability workers are the ones who earn the minimum wage including those who would be affected by increases to the minimum wage. High ability workers are those who earn above the minimum wage and lowest ability workers are those in the uncovered sectors that earn below the minimum wage. Most importantly, wage inequality looks at the comparison between the lowest ability workers and the high ability workers. This theory provides three main explanations. The first explanation relates to work in the covered sectors becoming more attractive when the minimum wage is increased. As labor-force participation in the covered sector increases, the labor-force participation rate in the uncovered sector decreases. This drop in labor supply causes the wage in the uncovered sector to increase. With the increase to the wage of the lowest skilled workers without an increase to

high-skilled workers, inequality decreases. Finally, the minimum wage increase could result in an excess of labor supply in the covered sectors, but the wage in the uncovered sector is below the lowest acceptable wage of the workers who become unemployed. This could lower the labor supply in the uncovered sector, thereby raising the wage of the lowest skilled workers and decreasing inequality.
Hence, both Freeman's Redistribution Theory and the Marginal Productivity Theory of income inequality can be used to establish that a negative relationship exists between minimum wage and income inequality, that is , a rise in minimum wage would lead to a decline in income inequality and vice-versa.

How does Income Inequality affect the economic growth of a country?

In macroeconomics the relationship between aggregate output and the distribution of income is an important one. The topic of income inequality has also received utter importance in economic circles and the press in the recent years. The World Bank Group has also included it among the key global objectives for development. This is to be achieved by focusing on eradication of poverty and by boosting the income levels of the bottom 40 percentile of the developing countries. The effect of changes in income inequality on GDP per capita may differ for the poor and the rich countries. A study by Galor and Zeira in 1993, shows that the effect of rising inequality of GDP in per capita terms in relatively rich countries is negative but positive in relatively poor countries. The World Economic Forum tests this by introducing in the panel model, interactions between countries' initial (beginning of sample) in per capita terms and income inequality.
The empirical analysis shows that for an average country between the sample period 1970-2010, an increase in income inequality has shown a reduction in GDP per capita. Specifically, it is observed that a 1% increase in Gini Coefficient reduces the GDP per capita by around 1.1% in the short run (time period of 5 years). Larger effects are observed in the long run (cumulative) and amounts to about -4.5%. From this it can be concluded, on an average, an increase in the level of income inequality leads to a reduction in GDP per capita growth. An increase in income inequality has long term negative effects on the level of GDP per capita. While the effect of income inequality on GDP per capita is negative, it does tend to vary with the initial income level of a country. For example, it is observed at the 25th percentile of the initial income a 1% increase in Gini Coefficient would lead to 2.3% effect on GDP per capita (corresponding standard error is 0.6%) whereas, at the 75th percentile of initial income level the effect will be of -5.3% (corresponding standard error if 0.8%). These estimates therefore suggest that an increase in income inequality raises GDP per capita in poor countries, whereas the opposite is true for the rich and middle income countries. Increases in income inequality leads to an increase in investment-to-GDP ratio in the lower income countries whereas it results in a decrease of investment-to-GDP ratio for the middle and high income countries. Furthermore, it is also noticed within countries that increases in the level of income inequality leads to an increase in human capital in poor countries. Human capital here, is measured by the average years of schooling and the population share with secondary and tertiary level education. The opposite is observed, for the rich and middle income countries i.e. an increase in within country income inequality leads to a decrease in human capital for middle and rich countries. It can be seen that income inequality in a country can be affected by a country's per capita GDP as well as other variables like their geography and history.
It can therefore be concluded that income inequality can have a significant negative effect on aggregate output in the sample for an average country. However, income inequality has a significant positive effect. Overall, income

inequality has a positive effect on the economic growth of a poor country whereas income inequality has a detrimental effect on the economic growth of an advanced economy.

MATHEMATICAL MODEL

In this paper, we look into the effect of minimum wage on income inequality. We say that an increase in the minimum wage level in an economy would lead to a fall in income inequality of the country. However, due to lack of data we use median income of a country as a proxy variable for minimum wage. We have used the World Income Inequality Database (WIID) 4 database. It is the one of most comprehensive dataset available on income inequality in the world at the moment. It provides information for 189 countries which may be developed , developing or in transition from a large span of time starting 1867 to 2017.
In the econometric model used in the paper income inequality is the dependent variable denoted by Y and the independent variables are median income of the country denoted by X_1, population size of a country denoted by X_2,the share of income of the 9th decile of a country by X_3, area covered denoted by X_4, EU (European Union) membership denoted by X_5, OECD (Organization for Cooperation and Development) membership denoted by X_6, detailed resource concept is denoted by X_7 and u denotes the error term. We have also introduced dummy variables to control for region and time.

REGRESSION ANALYSIS

In this section, we analyse different tools and methods we have used to examine our data set. As mentioned above, we have taken income inequality as our dependent variable and median income, mean income, GDP per capita, income share of the 9th decile and population as the independent variables.
Regression analysis, in statistical modeling, is a tool or a set of statistical processes used for estimating relationships between the dependent variable and the independent variables. The dependent variable is often called the outcome variable and the independent variable is known as the predictor, covariates or the features. The most basic and commonly used form of regression analysis is the linear regression. In linear regression, the researcher finds the line which fits the data most closely.

RESULT ANALYSIS

The mathematical model, as discussed above is given as:

$$Y = \square_0 + \square_1 X_1 + \square_2 X_2 + \square_3 X_3 + \square_4 X_4 + \square_5 X_5 + \square_6 X_6 + \square_7 X_7 + \square_8 D_1 + \square_9 D_2 + u_0$$

where,

X_1 represents the median income of a country.
X_2 represents the population size of a country.
X_3 represents the share of income of the 9th decile of a country.
X_4 represents the area covered.
X_5 represents EU membership.
X_6 represents OECD membership.
X_7 represents a detailed resource concept.
D_1 represents a dummy variable for the region.
D_2 represents a dummy variable for time.
u_0 is the disturbance or the error term.

INTERPRETATION OF REGRESSION RESULTS:

We get the following results for OLS estimation:

TABLE 1

gini_reported	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
median_usd	-.000282	.0000423	-6.66	0.000	-.000365	-.000199
population	2.13e-09	7.52e-10	2.84	0.005	6.60e-10	3.61e-09
d9	3.416061	.1588429	21.51	0.000	3.104499	3.727623
areacovr	-2.463386	.2984753	-8.25	0.000	-3.04883	-1.877942
eu	-1.707905	.4323512	-3.95	0.000	-2.55594	-.8598702
oecd	.919338	.4018692	2.29	0.022	.1310923	1.707584
resource_detailed	-.0123316	.0021305	-5.79	0.000	-.0165104	-.0081528

TABLE 2

The following results were observed for dummy variable D_1 and D_2

region_wb						
Latin America and the Caribbean	10.41597	.782756	13.31	0.000	8.880631	11.9513
Europe and Central Asia	-1.619637	.6492284	-2.49	0.013	-2.893065	-.3462085
Middle East and North Africa	.601253	.6211432	0.97	0.333	-.6170874	1.819594
Sub-Saharan Africa	6.824671	.7508693	9.09	0.000	5.351879	8.297462
South Asia	-.2956795	.6965782	-0.42	0.671	-1.661982	1.070623
East Asia and the Pacific	0	(omitted)				
_cons	-13.76317	7.151636	-1.92	0.054	-27.79073	.2643997

TABLE 3

year						
1982	4.898427	4.140925	1.18	0.237	-3.223785	13.02064
1983	5.440692	3.144085	1.73	0.084	-.7262686	11.60765
1984	1.604068	3.375934	0.48	0.635	-5.017653	8.22579
1985	1.697055	3.053997	0.56	0.579	-4.293203	7.687313
1986	2.90047	3.150263	0.92	0.357	-3.27861	9.079549
1987	3.608095	2.696973	1.34	0.181	-1.681879	8.898068
1988	4.01758	2.953129	1.36	0.174	-1.774831	9.80999
1989	3.115671	2.757319	1.13	0.259	-2.292669	8.524012
1990	3.966881	2.91546	1.36	0.174	-1.751643	9.685406
1991	3.122527	2.513189	1.24	0.214	-1.806964	8.052017
1992	3.395076	2.675051	1.27	0.205	-1.851899	8.642052
1993	4.670867	2.636123	1.77	0.077	-.4997516	9.841487
1994	6.729115	2.655344	2.53	0.011	1.520793	11.93744
1995	5.062576	2.557135	1.98	0.048	.0468868	10.07827
1996	5.232701	2.430328	2.15	0.031	.4657382	9.999665
1997	5.73906	2.510259	2.29	0.022	.8153151	10.6628
1998	6.027183	2.576641	2.34	0.019	.9732341	11.08113
1999	4.594584	2.436043	1.89	0.059	-.1835891	9.372757
2000	5.486703	2.44934	2.24	0.025	.6824491	10.29096
2001	4.582477	2.394906	1.91	0.056	-.1150087	9.279963
2002	4.412747	2.377626	1.86	0.064	-.2508442	9.076339
2003	4.312261	2.350202	1.83	0.067	-.2975405	8.922062
2004	4.684729	2.355864	1.99	0.047	.063823	9.305635
2005	4.188495	2.334657	1.79	0.073	-.3908137	8.767805
2006	3.712907	2.329733	1.59	0.111	-.8567452	8.282559
2007	3.752099	2.324388	1.61	0.107	-.807068	8.311266
2008	3.818251	2.336813	1.63	0.102	-.7652876	8.40179
2009	3.333622	2.327035	1.43	0.152	-1.230739	7.897982
2010	3.687877	2.346901	1.57	0.116	-.9154489	8.291203
2011	2.771011	2.335539	1.19	0.236	-1.810029	7.35205
2012	2.644393	2.337255	1.13	0.258	-1.940012	7.228799
2013	3.235876	2.327475	1.39	0.165	-1.329346	7.801098
2014	2.575636	2.339226	1.10	0.271	-2.012635	7.163908
2015	3.75507	2.355747	1.59	0.111	-.8656063	8.375747
2016	1.951644	2.415655	0.81	0.419	-2.786539	6.689827
2017	.8508191	2.872292	0.30	0.767	-4.783034	6.484672

The above tables can be interpreted as or the sample regression model can be given as:

FROM TABLE 1

$$\hat{Y} = +(-0.123316) + (-0.000282)X_1 + (2.13e\text{-}09)X_2 + (3.416061)X_3 + (-2.463386)X_4 + (-1.707905)X_5 + (0.919338)X_6 + (-0.0123316)X_7$$

From the above equation, it can be interpreted that median income of a country, area covered by the data, EU membership and detailed resource concept have an inverse relation with income inequality (due to a negative coefficient values). However, an opposite trend is observed for the population of a country, share of income of the 9th decile of the population and OECD membership i.e. there is a direct relation between these two variables and income inequality.

More specifically,
Increasing minimum wages helps increase the income levels of the bottom decile of an economy, which increases the median income level of a country. This increase leads to a downward shift in income inequality. It is also observed that as more and more villages (rural) and cities (urban) are covered, there is a fall in income inequality. Therefore, as the survey takes more area under observation, more is falling in income inequality. Similarly, as the resources of a household such as their net income, net consumption and net savings increase a downward trend is observed in income inequality. Less levels of income inequality is also observed among countries which are members of European Union.
Independent variables such as population have a positive relation with income inequality i.e. an increase in population leads to an increase in income inequality. This can be explained due to population heterogeneity. It can also further be explained that as population growth is often among the lower income levels due to high fertility rates. Keeping their incomes constant, an increase in population would decrease income per head. This would lead to a further increase in income inequality. There is also a positive relation between income share of the 9th decile and income inequality. This can be very easily explained, as an increase in the income levels of the top 10th decile keeping the income levels of all other deciles would lead to a huge jump in income inequality. As it would increase the gap between the income levels of top ten and bottom ten decile levels of a country. OECD membership and income inequality also have a positive coefficient indicating a high level of inequality in countries which are OECD members.

FROM TABLE 2

In table 2, we have controlled for different regions by taking dummy variable D_1. North America is omitted from the table as it is taken as the base category. From the table it can be interpreted that:

- Latin America and Caribbean, Middle East and North Africa, Sub-Saharan Africa, East Asia and the Pacific have higher income inequality in comparison to North America (due to positive coefficient).
- Europe and Central Asia have lower income inequality in comparison to North America (due to negative coefficient).

FROM TABLE 3

In table 3, we have controlled for time as by taking dummy variable D_2. It can be clearly observed from the table that income inequality has followed a trend over the years. From 1982-88, it kept fluctuating. However, after 1988 a clear pattern can be observed. From 1989-92, it remained more or less constant and then there was a jump in 1993 and 1994. After 1994, there has been a steady decline in income inequality levels. There have been a few exceptions over the years like in 1998, 2000 and 2013 but overall it can be said that there has been a positive and

sustainable decline in gini coefficient values over the years, with gini coefficient touching an all-time low in 2017 with a coefficient value of 0.8508191.

TEST FOR MULTICOLLINEARITY

Multicollinearity refers to a situation in which one independent variable is highly linearly correlated to another independent variable in a multiple regression model. Perfect multicollinearity exists if the correlation between two or more independent variables is equal to 1 or -1. It is computed by computing the Variance Inflation Factor (VIF). In a good model, the value of VIF should not exceed more than 10.

Variable	VIF	1/VIF
median_usd	3.50	0.285908
population	1.70	0.588640
d9	1.61	0.621463
areacovr	1.58	0.631874
eu	2.84	0.351859
oecd	2.55	0.391730
resource_d~d	3.47	0.288518

From the above table it can be observed that the values of our independent variables do not exceed 10, which indicates it is a stable model. Since, the values of VIFs are quite low, it can be stated that there is low multicollinearity between the independent variables.

HETEROSKEDASTICITY TEST

Heteroskedasticity refers to unequal scatter. It is measured for the residuals or error term, in our model u_0. The following results are obtained in our model when tested for heteroskedasticity.
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity

Ho: Constant variance
Variables: fitted values of gini_reported
chi2(1) = 69.44
Prob > chi2 = 0.0000

From the above equations, it can be observed that the t-value is very low in fact zero. Therefore, it can be concluded that H_0 , is rejected i.e. the assumption of constant variance is not true. To confirm this we run the JB (Jarque Bera) test.

Jarque-Bera normality test: 2868 Chi(2) 0
Jarque-Bera test for Ho: normality:
Since, the t-values are coming less than 0.05, that means our residuals are not normally distributed.

Other Regression Statistics:

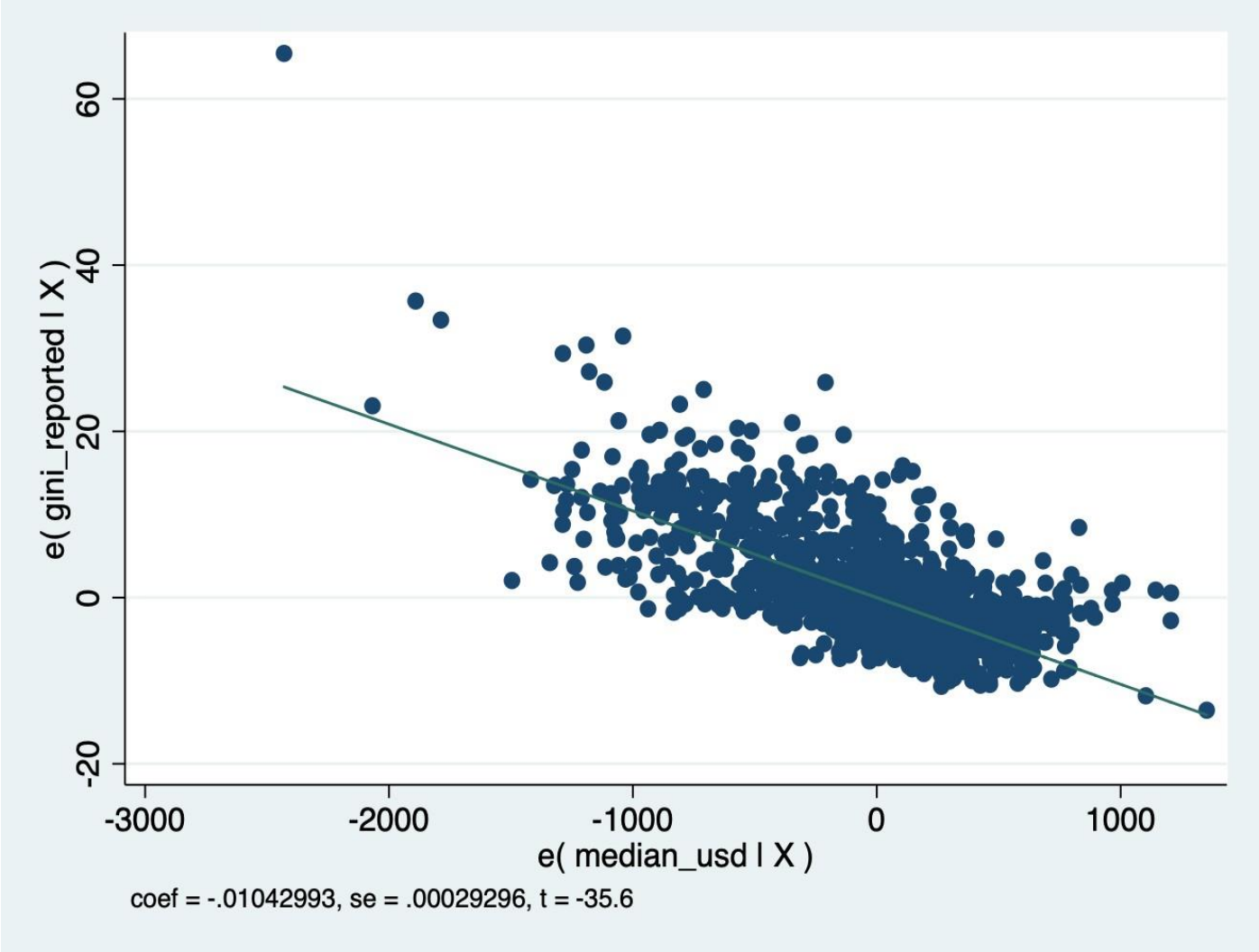
Number of obs = 1,649
F(49, 1599) = 107.77
Prob > F = 0.0000
R-squared = 0.7676
Adj R-squared = 0.7604
Root MSE = 4.6454

EFFECT OF INDEPENDENT VARIABLES ON THE DEPENDENT VARIABLE

Median Income

The median income is the income amount that divides a population into two equal groups, half having an income above that amount, and half having an income below that amount. Economists use measures of median household income to understand the wellbeing and economic health of different areas, and median income is commonly used to compare the relative wealth of different countries, states or regions. It is argued by economists that there exists a negative relationship between median income and income inequality. Taking individual countries or regions as the unit of analysis, if the median income of a single unit of analysis, that is , a country or region rises, keeping the median incomes of other countries in the world constant, then the degree by which the given country was poorer to the relatively richer nations decreases, and hence this leads to a fall in the level of income inequality in the world.
There is data available to support the argument of a negative relationship between median household income and income inequality. For the first full business cycle in America, since at least the 1970s, median income fell slightly between 2000 and 2007, and fell even more during the Great Recession. At the same time, the income inequality had risen.
As it can be seen from the graph , there is a negative relationship between median income and income inequality and hence the graph is a downward sloping line. The value of the gini coefficient comes out to be -0.0142993.
This satisfies the negative relationship proposed by economists between the median household income and

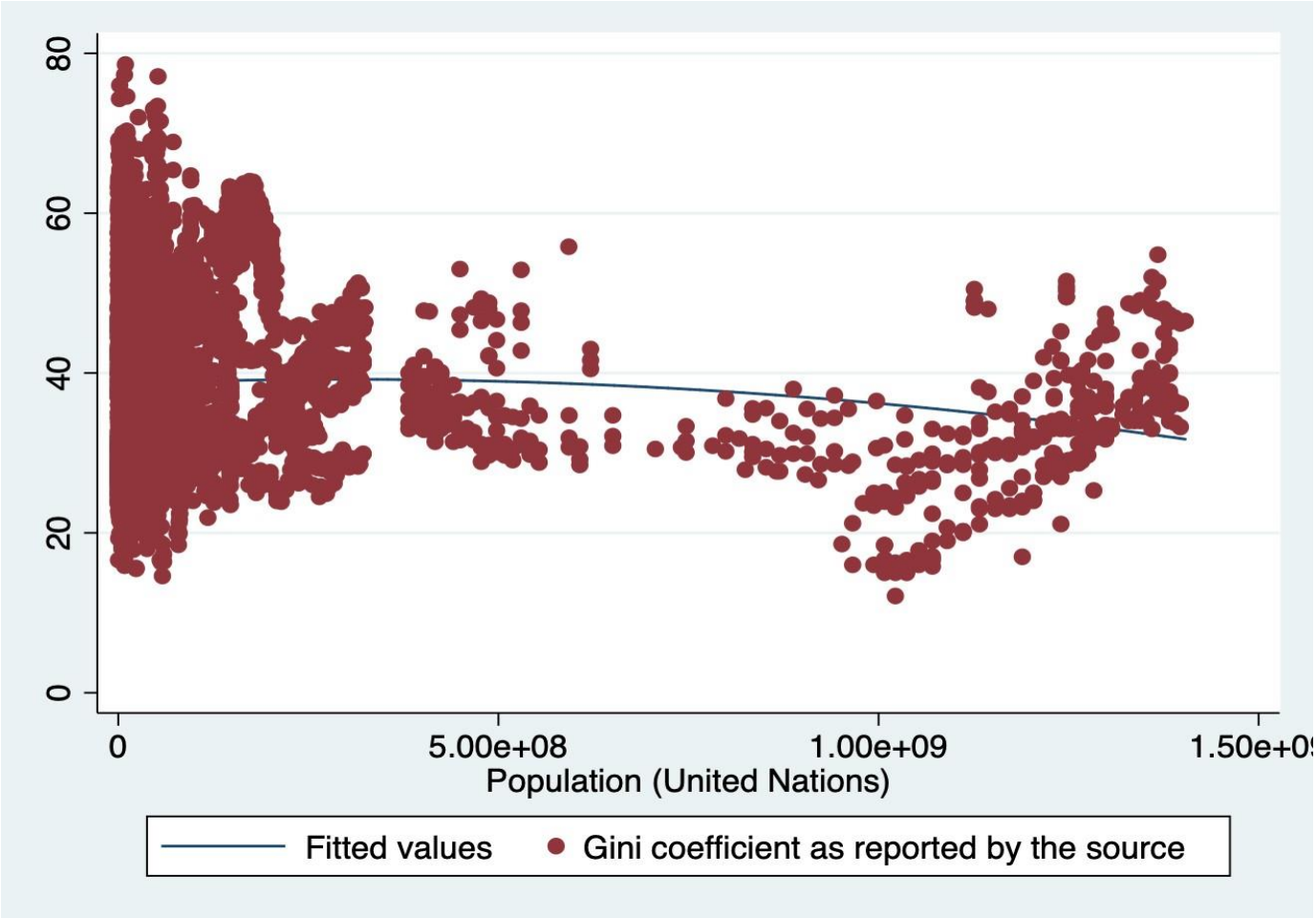
income inequality. Hence, with a rise in these regions in the median household income, the income inequality has shown a decreasing trend.



Population

It has been found that there is a negative relationship between population and income inequality. When there is a high population, there is huge competition, which compels people to invest more in health and education in order to increase their chances of survival. Due to a rise in the overall investment in health and education, economic growth and development is facilitated. This causes a demographic transition causing a reduction in the income inequality. Hence, a high population causes the level of inequality to reduce.

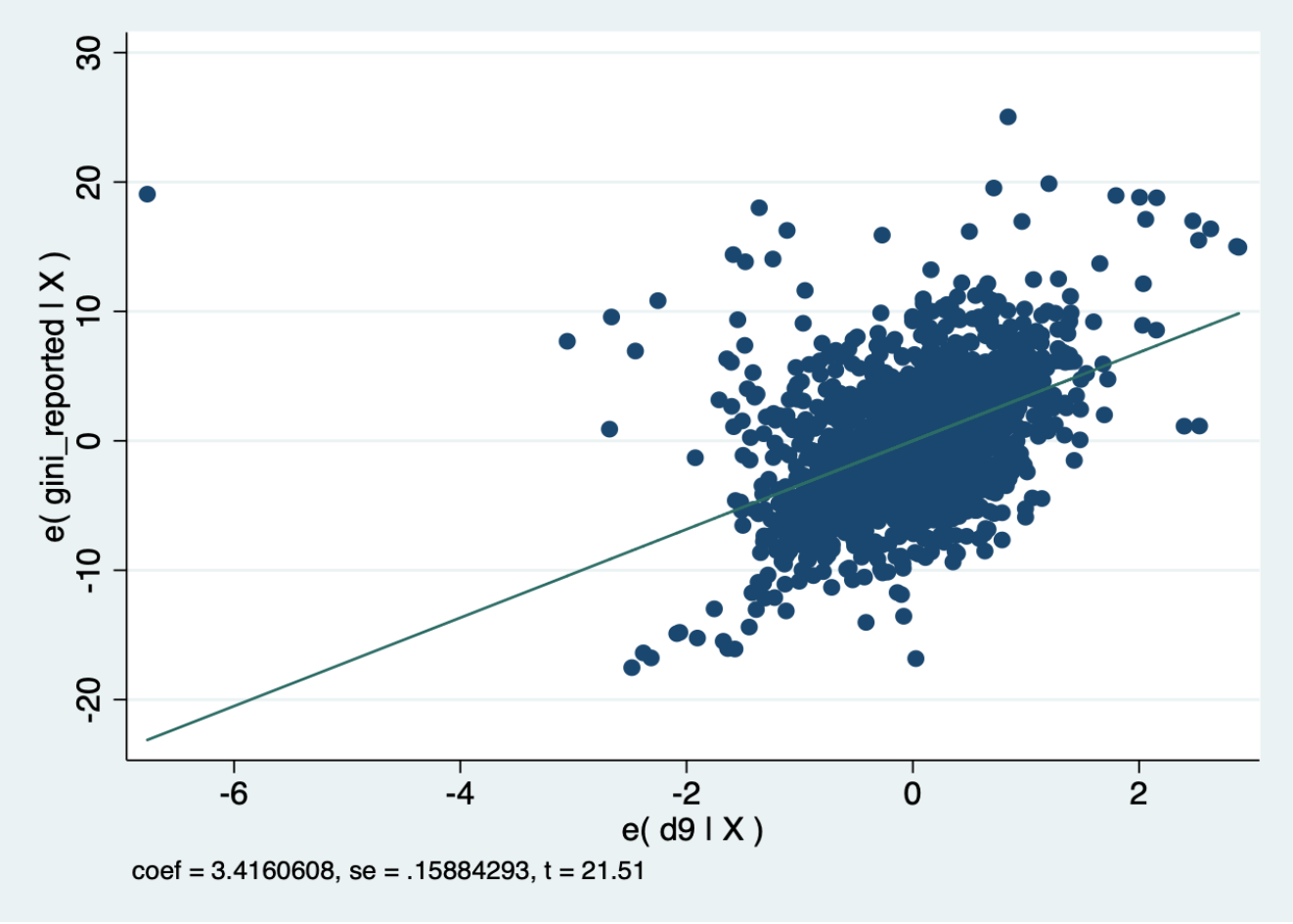
This negative relationship can be seen in the above graph. The value of the gini coefficient is -2.369e-09 which depicts the negative relationship between population and income inequality.



Share of income of the 9th decile

Deciles are the percentiles that are multiples of 10. The ninth decile is the point with 90 percent of the data below it and 10 percent above it. The rising income share of the top 10 percent earners rises at a rate higher than the income of the rest of the earners. In 2016, more than half of the world's income went to the top 10 percent of the population. The trend, however, significantly varied across different regions across the world with Europe being the most equal where 37 percent of the income went to the top 10 percent and the Middle East is the most unequal region where the figure stood at 61 percent. The data from the U.S. Congressional Budget Office shows that between 1979 and 2005, the after-tax income of Americans in the middle of the income distribution rose by 21 percent while among the top 10 percent earners, it rose by 400 percent. In the decade to 2007, real household income increased by an average of 1.2 percent a year in the United States. But when the top 10 percent of earners

is excluded, that figure falls to 0.6 percent. In effect, the top 10 percent took 58 percent of the gain in real incomes. So, what looked to be an overall improvement in the population's economic well-being actually benefited a much smaller group than the broad figures seem to suggest. It is evident from this data that a rise in the growth is enjoyed mostly by the top 10 percent of the earners. There is a positive relationship between 9th decile and income inequality. If there is a rise in the income of the top 10 percent earners, keeping the income of the others constant, then there would be a huge rise in income inequality.As it can be seen from the graph above, which is a positively sloped line ,with a rise in the 9th decile, the income inequality would rise. The value of gini coefficient is 2.7299892 which depicts a strong positive relationship between 9th decile and income inequality.



Policy Interventions to Reduce Income Inequality

Income inequality is also influenced by structural policies. There are many reasons why income inequality can negatively impact societies. When the economic gaps become too great, it can give wealthier people an unacceptable degree of control over other people's lives. In the most extreme of cases, this can create an aristocratic society, where money equates to power, undermining the roles of the government. Since median income , population, 9th decile is easier to control than income inequality, countries should perhaps aim for controlling these variables that would further help in reducing income inequality .
Structural policies in the areas of education, labour and product markets influence income inequality by affecting the dispersion of earnings among those who have a job. Policies that foster equity in education lower income inequality by reducing the dispersion of earnings. Examples include increasing the minimum wage relative to the median wage, increasing the level of employment protection and increasing the generosity of unemployment benefits. One labour market reform that stands out as having a positive effect on both employment and earnings equality is lowering the gap of employment protection on temporary and permanent work.

- Providing more jobs: If the private market fails to provide enough jobs to achieve full employment, the government must become the employer of last resort.
- Education policies: Policies that increase graduation rates from upper secondary and tertiary education and that also promote equal access to education help increase median income and thus reduce inequality.
- Well-designed labour market policies and institutions can reduce inequality: A relatively high minimum wage helps in boosting the employee productivity and also in increasing the median household income leading to reduced income inequality.
- Removing product market regulations that stifle competition can reduce income inequality by boosting employment and further improving the state of current median income.
- Policies that foster the integration of immigrants and fight all forms of discrimination help in increasing median income and thus reduce income inequality.
- Tax and transfer systems play a key role in lowering overall income inequality: Three quarters of the average reduction in inequality achieved across the OECD is due to transfers. However, the redistributive impact of cash transfers varies widely across countries, reflecting both the size and progressivity of these transfers. In some countries, cash transfers are small in size but highly targeted on those in need. In some others ,large transfers redistribute income mainly over the life-cycle rather than across individuals, and their progressivity is often low.
- Progressive Taxation: Of the various types of taxes, the personal income tax tends to be progressive, while social security contributions, consumption taxes and real estate taxes tend to be regressive. Progressivity could be strengthened by cutting back tax expenditures that benefit mainly high-income groups such as tax relief on mortgage interest. In addition, removing other tax reliefs – such as reduced taxation of capital

gains from the sale of a principal or secondary residence, stock options and carried interest – would increase equity and allow a growth-enhancing cut in marginal labour income tax rates. It would also reduce tax avoidance instruments for top-income earners and hence help redistribute income.

- Many policies entail a double dividend as they reduce income inequality while at the same time boosting long-run GDP per capita. Examples include facilitating the accumulation of human capital, making educational potential less dependent on personal and social circumstances, reducing labour market dualism or promoting the integration of immigrants and fostering female labour market participation. Concerning taxation, reducing tax expenditures, for instance for investing in housing, contributes to equity objectives while also allowing a growth-friendly cut in marginal tax rates.
- Imposing wealth or inheritance taxes: A wealth or inheritance would raise GDP per capita and also have a good distributional effect and thus reduce income inequality.
- Building assets for working families: Policies that encourage higher savings rates and lower the cost of building assets for working and middle class households can provide better economic security for struggling families. New programs that automatically enroll workers in retirement plans and provide a savings credit or a federal match for retirement savings accounts could help lower-income households build wealth. Access to fair, low-cost financial services and home ownership are also important pathways in reducing income inequality.
- Cash Benefits: Cash benefits are designed to help those on low or zero original income, and include contributory and non-contributory benefits. Contributory benefits, such as pensions and job-seekers' allowance, are those where individuals or employers make a contribution into the National Insurance Fund. Non-contributory benefits including housing benefit, income support, carer's benefit and child support, do not require a previous contribution to have to made.
- When growth is below capacity and the job market is slack, apply fiscal and monetary policies to achieve full employment. This means not raising interest rates and investing in public infrastructure.
- Take actions against countries that manage their currencies to subsidize their exports to us and tax our exports to them. Such actions can include revoking trade privileges, allowing for reciprocal currency interventions, Providing more jobs: If the private market fails to provide enough jobs to achieve full employment, the goand levying duties on subsidized goods.
- Support sectoral training, apprenticeships, and earn-while-you-learn programs.
- Implement universal pre-Kindergartens , with subsidies that phase out as incomes rise.
- Raise the minimum wage and raise the overtime salary threshold and index it to inflation.
- Make work pay for all workers, including childless adults, by raising the minimum wage and strengthening the earned income tax credit child tax credit.
- Ensure stability for workers and their families through access to paid leave and predictable job schedules.
- Identify and tear down the systemic barriers that people face because of race, ethnicity, language, and immigration status, for example by making college prep courses equally available in high schools attended mostly by students of colour or by providing work authorization and a path to citizenship for immigrant parents.
- Ensure that every working family can afford high-quality child care through significant investments in child care and development and make preschool education available to all three- and four-year-olds.

- Give children and their parents a simultaneous boost generational policies and investments , including home visiting, support for parental mental health, and support for parents' career development coupled with high-quality early care and education for children.
- Help low-income youth and adults access employment and training opportunities that lead to economic success and provide subsidised and summer jobs programs.
- Fully fund Pell Grants to help low-income students access higher education and develop the skills needed to compete in a competitive job market.
- Ensure that everyone, including low-wage working families and single adults, has access to basic health and nutrition by expanding Medical facilities in every state.
- Strengthen capacity of states to employ more streamlined and integrated approaches to delivering key public work supports such as health coverage, nutrition benefits, and child care subsidies ,so low-income working families can stabilize their lives and advance their career
- Rebuild unemployment insurance and cash assistance to ensure a strong safety net that supports poor and low-income children, families, and individuals when they need it.
- Correct political : level the playing field and limit the influence of corporate lobbyists.
- Ensure that the wealthiest people and profitable corporations that benefit the most from our political and economic system contribute their fair share: reform upside down tax expenditures, that is spending through the tax code that disproportionately benefits those with higher incomes, limit corporate welfare, and enact a robust inheritance tax.
- Amplify workers' bargaining power by increasing fines for illegal anti-union behavior, encouraging minority unions , and reversing laws that undermine unions and prevent them from collecting dues for benefits they provide workers at unionized workplaces.
- Update labor standards—raise the national minimum wage and index it to wage growth, require fair scheduling for workers, target employee-contractor misclassification and wage.
- Modernize the safety net—update Unemployment Insurance to reflect the changing nature of work; increase Social Security benefits and raise the cap on income subject to taxes; expand Medicaid in every state to refocus it on employment and child well-being outcomes.
- Provide families tools to manage their many responsibilities—provide at least 12 weeks of paid family and medical leave, universal early learning and care, an expanded Earned Income Tax Credit , a child allowance, and comprehensive family planning services.
- Expand opportunities for current and future workers—invest in infrastructure and other nationally needed jobs; enact income-based loan repayment to increase higher education accessibility and affordability; and pursue full employment.
- Increase affordable housing and bolster consumer financial protection rules—promote fair and accessible banking, savings, and other financial vehicles and services for those excluded or abused by the current system.
- Attack racial and other discrimination across the board and enact comprehensive immigration reform, normalizing the status of more children and workers to increase their educational and work opportunities.

- Raise the minimum wage and index it to inflation. States can raise wages for workers at the bottom of the pay scale by enacting a higher state minimum wage *and* indexing it so that it keeps up with rising living costs.
- Protect workers' rights: States can raise wages by protecting workers' right to bargain collectively and by strengthening and enforcing laws and regulations to prevent abusive employer practices that deprive workers of wages they are legally owed.
- Improve unemployment insurance: Unemployment Insurance helps workers who lose their jobs through no fault of their own to avoid falling into poverty and to stay connected to the labor market.
- Establish subsidised employment programs for low-income parents and youth that provide temporary jobs of last resort.
- Improve school funding formulas: government schools are often poorly funded. As a result, children attending these schools begin their education with inadequate resources. States can help by adopting funding formulas that give extra support to these schools.
- Expand early education.States can help families work and kids learn by investing in quality, affordable early care and education programs, as well as after-school programs.

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