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An Empirical Analysis of Poverty and Income Inequality in U.S. Southeastern States

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AN EMPIRICAL ANALYSIS OF POVERTY AND INCOME INEQUALITY IN U.S. SOUTHEASTERN STATES

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Abstract:

This paper analyzes the impacts of education achievement, percentage of households led by a single parent, the percentage of minority population, per capita personal income, percentage of population over 65 years old, and minimum wage on income inequality in 9 southeastern states of the United States, as well as the effects of these variables on poverty, measured as the percentage of the population below poverty level. These southeastern states are Alabama, Arkansas, Georgia, Florida, Louisiana, Mississippi, Oklahoma, Tennessee, and South Carolina. The period of time used for this analysis is from 2000 to 2019. Panel data was used for this research, and two separate random effect models:

1. Model 1: Determinants of poverty
2. Model 2: Determinants of income inequality

Another important variable added to these models is a dummy variable representing the Great Recession. The variable is defined as 0 if the period is before the Great Recession, and 1 if the period is after the Great Recession. As we all know, the Great Recession was the largest economic meltdown in the U.S. since the Great Depression, which lasted a little over 18 months. The Great Recession affected GDP, which contracted steeply, and then the economy started to grow again.

How did the Great Recession affect poverty and income inequality? The empirical results show a positively significant relationship between the dummy variable and poverty; but seems to be insignificant in the income inequality model.

Keywords: poverty, income inequality.

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1. Introduction:

Income inequality and poverty have been very hot topics for economists in the United States. Inequality has been rising in America for over 20 years. Two of the income distribution measures mostly used by economists are the Gini index and the aggregate household income received per quintile (Bureau). In this paper the income distribution measure used is the Gini coefficient, which lies between 0 and 1 (0 representing no income inequality, and 1 representing high income inequality).

High poverty rates and high unemployment rates are the main reasons why young adults are part of the rural life, especially in states like Alabama, or Arkansas. Poverty is a chronicled unavoidable truth in numerous American rural areas. In the 1980s, there was a noticeable economic expansion, which did not affect the high poverty rates (Deavers and Hoppe, 1992). With this being said, it is shown that the poor are at a huge disadvantage when looking for a job, or a higher income, even when the economy is showing economic growth.

The causes of poverty is a list that goes on and on (Duncan, 1992). The research has shown that there is a relationship between poverty and the labor market, racial and gender inequality, welfare support programs, households led by single parents, economic insecurity, or low human capital.

To give public services, and to reinforce and broaden every state's economy, strategy policy makers need to be aware of the poverty level and the idea of pay distribution designs. Understanding the qualities of the rural poor is very important for planning explicit advancement arrangements to lessen the reasons for poverty and ease income inequality.

This study applies Random Effect model for both models (determinants of poverty and determinants of income inequality). Random Effects models are “statistical models in which

some of the parameters (effects) that define systematic components of the model exhibit some form of random variation" (Salkind, 2012). The data used is over the period 2000 to 2019 for 9 American states located in the southeastern region of the country.

This paper is divided into five parts. In the first part, "Brief Background on the states", I give a background on all the states used on my research. In the second part, "Literature Review", I review the studies and research exploring the correlation between my independent variables and poverty, and income inequality for different countries. This second part is divided into 4 sections:

- Income Inequality and Poverty in the U.S.
- Income Inequality and Poverty in Central America and South America.
- Income Inequality and Poverty in Western Europe.
- Income Inequality and Poverty in Africa.

After that, I present the data set and its properties. Thirdly, I present the empirical analysis, where I explain the methodology, the preliminary tests, the baseline models, and the empirical results. The final part is the conclusion, where I show a summary and concluding remarks.

2. A Brief Background on the States:

- <u>Alabama:</u>

Among the 50 American states, Alabama is significantly poor, and the median family income has stayed below the national average for decades. Alabama's employment is mostly focused on farm-related employment, which has actually decreased; as well as the agriculture's share of Alabama's economy.

Primary and secondary education in Alabama had improved significantly in the last half of the twentieth century, however government funded schools in the state have kept on experiencing weak local funding coming about because of the state's low property taxes. Educators' compensations have been rising, yet at the same time rank among the lowest in the country. Rural schools get less help than those in metropolitan zones.

The average drop in income among the bottom 20% of households in Alabama has been a 13.5% over the last ten years; while the average increase in income among the top 20% of households in Alabama has been 13.8%. This income inequality has been worsening since the 1970s. If we look at the income inequality by population groups, the research showed a 16.8% increase for the poorest 20% of households; a 31.5% increase for the middle 20% of the households in Alabama; and a 71% increase for the richest 20% of the households in Alabama. According to the Center on Budget and Policy Priorities (2012), the richest 5% of households in Alabama have an average income 12.8 times higher than the bottom 20% of the households, and 4.5 times larger than the middle 20% of households.

- Arkansas:

With a total population of over 3 million, the median household income in Arkansas in 2018 was $47,062; and the poverty rate was at a 17.6%. The ethnic groups in Arkansas are white (non-Hispanic) 72.1%, black or African American (non-Hispanic) 15.1%, white (Hispanic) 4.38%, other (Hispanic) 2.66%, and two or more races (non-Hispanic) 2.54%. Females in Arkansas have an average income ($42,470) 1.35 times lower than the average male. The income inequality in Arkansas in 2018 was lower than the national average, measured using the Gini coefficient; it was 0.45.

In Arkansas, 17.6% of the population lived below the poverty level, which is higher than the national average of 13.1% in 2018. The Census Bureau uses a "set of money income thresholds that vary by family size and composition to determine who classifies as impoverished. If a family's total income is less than the family's threshold than that family and every individual in it is considered to be living in poverty" (Arkansas, 2018).

The gross domestic product (GDP) by state, also known as gross state product (GSP), is used to measure the output of each state's economy each year; it is used to measure how much of all the goods and services' final value was created in that state. The U.S. Bureau of Economic Analysis (BEA) shows different sectors used to measure each state's gross state product, like construction, retail trade, health care, or military. In the case of Arkansas, the private industry sectors that contribute the most to the GDP are insurance, real estate, manufacturing, and professional and business services (Economics, s.f.).

- Georgia:

Georgia is one of the states that has been raising the living standards of its population. The economic growth of this state has been increasing from 2005 averaging a 5% increase annually. The economy in the state of Georgia grew by 2.7% in 2016, driven mostly by construction (The World Bank, 2021). In 2019, poverty declined to a 19.5%, almost half of poverty rate in 2007 because of the macroeconomic policies implemented and the improved governance. According to The World Bank data found for the state of Georgia in 2020, the total population was 3.7 million, the GDP (measured in current US$ billion) was 15.9, the GDP per capita (current US$) was 4,275, and the life expectancy at birth in years was 74.1.

Georgia's GSP in 2019 reached almost $540bn, which is a growth of a 3% from 2014 to 2019 (IBISWorld, 2021). What employment trends are impacting Georgia? In 2018, the state of Georgia employed 6.3 million people, which is a 2.7% growth rate from 2013 to 2018. The sectors of employment mostly used in this state are health care and social assistance, retail trade, and scientific/technical services.

According to IBISWorld, the per capita personal income, also known as DPI (disposable personal income) is the amount of money that someone has available to use for spending or saving after income taxes. In 2018, Georgia's DPI was around $46,000, 37th out of all 50 states in the U.S.

- Florida:

The data found at the U.S. Bureau of Economic Analysis for Florida's gross domestic product (GDP) shows a growth rate of a 4% in 2015, about 1% higher than the national average. The next year, the growth decreased by almost 1% (3.2%), which is still above the national average (1.6%). In 2017, the real growth decreased by 1% (2.2%), which was equal to the national level (Bureau of Economic Analysis (U.S. Department of Commerce), 2018).

What are the economic strengths of Florida? There are many economic strengths that help the state of Florida economically (Facts about Florida, 2013):

- International trade: being so close to Latin and South America, 40% of U.S. exports pass through Florida.
- Tourism: in 2011, there was a record number of visitors in Florida (87.3 million). The tourism industry has a huge economic impact on Florida's economy; about $67 million.

- Agriculture: the southeastern states are known for its farm industry, but Florida leads all these states. It produces over 65% of oranges in the U.S. and supplies about 40% of the world's orange juice.

Population growth is one of the main reasons why the state's economic growth is increasing, and the population over 65 years who retire in Florida have a very important impact on it as well. The growth rate between 2020 and 2030 is expected to increase, and Florida's older population is expected to represent almost 57% of these gains (Florida's Economic Future & the Impact of Aging, 2014).

- Louisiana:

In the 1700s and 1800s, Louisiana's economy was mainly focused on agriculture, specially cotton in the northern counties, and sugarcane in the southern counties. In the late 1800s, lumbering began to grow and became the major part of Louisiana's economy until the 21st century. Nowadays, agriculture is not as important as it was to Louisiana's economy back in the day. Only a small percentage of the state's population own their own farm and make a living out of it (Economy of Louisiana, 2014).

Moreover, education in Louisiana has been at the bottom of the list of all fifty states. Louisiana has over 20 public institutions and 10 private institutions of higher education. Louisiana State University (LSU) is the foundation of Louisiana's system of higher education. Education is one of the top priorities in Louisiana today. Louisiana is a state that has always been ranked at the bottom of the 50 states on educational quality. According to the Southwest Educational Development Laboratory, "educational leaders in Louisiana are taking an approach to reform that focuses on the entire educational system to ensure that change takes place in an

integrated way, rather than progressing in a piecemeal fashion. They are looking to the national reform movement for guidance and support in improving the quality of education for all students in the state. Teaching in Louisiana is expected to improve as teachers are given more resources, responsibilities, and opportunities to learn new skills" (The Progress of Education in Louisiana, 1996).

- Mississippi:

There has been an outstanding improvement in employment in Mississippi since the mid-20th century, but in the 21st century, the per capita gross product of the state was amongst the lowest in the country. Some of the largest sectors of the state's economy are retail trade, real estate, and health and social services. In the 20th century, since the number of farms in Mississippi decreased, Mississippi's economy became not as dependent on agriculture as it used to be. Once the 21st century began, the agriculture sector became only a tiny part of Mississippi's gross state product (Economy of Mississippi, 2020).

In 2019, Mississippi's gross state product was over $104bn, which shows a growth of 0.8% from 2015 to 2019. When comparing it to all the other U.S. states, Mississippi's GSP growth ranks 44th. What sectors affect Mississippi's GDP? The main sectors that give more gross domestic product and employ more people are manufacturing, real estate, health care and social assistance, retail trade, finance and insurance, food services, and construction. There are many others, but those are the main sectors that give the most gross domestic product (Mississippi - State Economic Profile, 2019).

- Oklahoma:

Most states' economy has been balanced, but in the case of Oklahoma, it has not always been that way. A significant percentage of the population has been considered below poverty level for years; the annual per capita income (also known as median household income) is significantly below the national average. As said above, there are different sectors that give more gross domestic product and employ more people. In Oklahoma, these sectors are retail trade, manufacturing, finance, insurance, real estate, transportation, and construction.

Agriculture has been a very dominant part of Oklahoma's GSP, but as years go by, the number of farms keeps decreasing. Oklahoma's mineral production is one of the highest in the country. Historically, oil and gas have always been very important components of Oklahoma's economy (Economy of Oklahoma, 2019).

- Tennessee:

Even though Tennessee is now mostly industrial, most of the population still resides in urban areas, where the population make a living off their land. Agriculture is a big factor in Tennessee (cotton, tobacco, soybeans, and dairy products). Not only is agriculture important for Tennessee's economy, minerals are as well. The top mineral in Tennessee is stone, followed by zinc, which production is led by Tennessee.

Tourism is a very important factor when speaking about Tennessee's economy. Tennessee has been a major tourist destination because of its famed music capitals, like Nashville for its country music, or Memphis for its jazz (Tennessee: Economy, 2012).

According to the Statista Research Department, "in 2020, the real Gross Domestic Product (GDP) of Tennessee decreased by roughly 4.9 percent compared to the previous year.

The state's real GDP experienced the most growth in 2004, when it increased by 4.9 percent when compared to the previous year" (Annual percent change of the real GDP in Tennessee from 2000 to 2020, 2021).

- South Carolina:

The Civil War was devastating for South Carolina, both for its population as well as its economy, but at the beginning of the 20th century, the state began to see changes. The manufacturing sector started to provide economic relief to its workers, and with the Civil Rights movement in the 1960s, segregation and legal discrimination ended, though racial divisions remain a concern for South Carolina today.

South Carolina's tourism sector has increase in the past few years with Charleston and Myrtle Beach as two of the top East Coast vacation spots (South Carolina, 2019).

South Carolina's GDP (Gross Domestic Product) was almost at $220 billion in 2017 (26th in the country). In 2018, this GDP grew by 2.3%; the factors that contributed to this increase were manufacturing, construction, professional and business services, and health care and social assistance (South Carolina Economic Analysis Report, 2018).

3. Literature Review:

This section is divided into different sections, depending on what countries it is focused on. Firstly, the United States, which is followed by Latin and South America, Western Europe, and Africa.

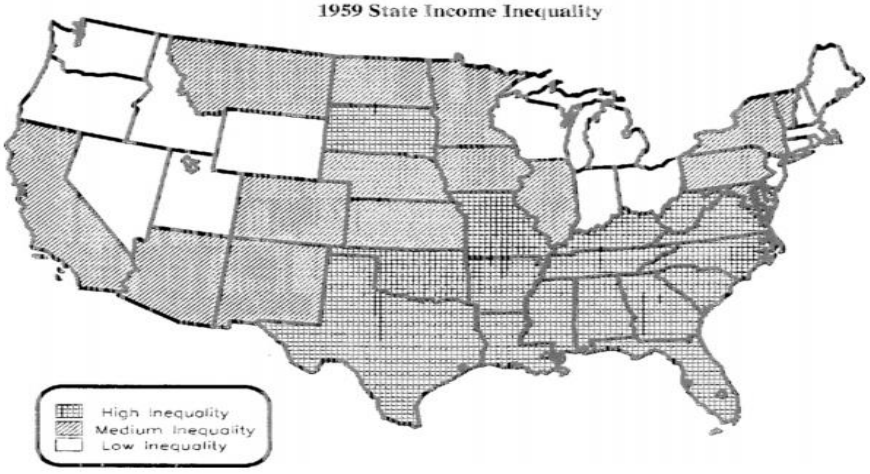
3.1. Related Literature to Income Inequality and Poverty in the U.S.:

Income inequality has been a hot topic in the United States for over 40 years, or even as early as the 1960s, but economists have been giving the situation more attention in the last 10 years. Southern states have been known to have a higher inequality than other states in the United States. Most of the previous research has been focused on the determinants of state income inequality, by using cross-sectional data analysis for a given year, even though there has also been panel data (cross-sectional data for multiple periods of time).

William Levernier's (1995) research on income inequality in 48 states for 1960, 1970, 1980, and 1990, showed that an increase in income inequality in the 1980s was positively related to households led by single women or mothers, and immigrants from many foreign countries. He measured family income inequality with the Gini coefficient, which lies between 0 and 1; the higher the value, the higher the degree of income inequality. On his paper, he showed the following figure; the state income inequality in 1959.

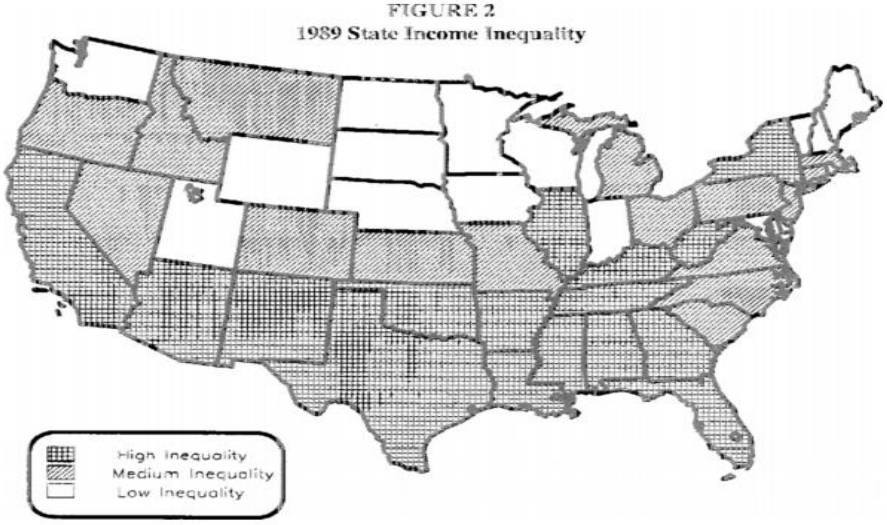
Figure 1 shows that states with the highest income inequality in 1959 were concentrated in the Southeast. Income inequality was at its lowest in New England, the Great Lakes and the Northwest.

FIGURE 1
1959 State Income Inequality



The degree of income inequality in the U.S. seriously shifted between 1960 and 1990. On the one hand, the states with high income inequality were not only concentrated in the South; states like New York or Illinois shifted into this group. Figure 2 shows the change of income inequality in the Unites States in 1989.

FIGURE 2
1989 State Income Inequality



In his model, he included economic, demographic, human capital, labor market, and regional characteristics. The results showed that in the 1980s, the factors that caused an increase in income inequality were international migration and the households led by single females. On the other hand, the factors that reduced income inequality were high school degree attainment, labor-force participation, goods-producing employment share, and transfer payments.

The general literature mentions education as one of the factors that most affect income inequality all around the globe. This mostly happens in African countries, but it is still noticeable in the United States, where the children of the wealthy have more opportunities for educational achievement than the children of everyone else in the country (Reardon, 2014). One of the

clearest ways of noticing the economic inequality that the United States is experiencing, is the educational achievement gap between the children of the wealthy population and the children of the non-wealthy population. Today, the educational gap is mostly defined by wealth and income; more so than ethnicity or race. Back in the 1950s and 1960s, it was the other way around; racial discrimination was the main aspect that led to inequality in the United States. But civil rights and anti-discrimination legislation led to better economic, educational, and social conditions for minorities in the United States of America.

Sousa-Brown (2004) analyzed the determinants of poverty and income inequality in the rural counties of West Virginia, by using OLS and 2SLS regressions with cross-sectional county data. The empirical results showed simultaneity between poverty and income inequality; making poverty the main determinant of income inequality in the counties of West Virginia.

Manufacturing is another important variable when talking about income inequality. Over the last 50 years, the United States has been through a couple trends: the increase in income inequality, as well as The Industrial Period (1945-79), The Deindustrialization of America (1980-2000) and then The Reindustrialization (Bolden, Clark, & Agbodzakey, 2020). Their hypothesis was that manufacturing plays a very important role in income inequality. They focused on the relationship between manufacturing and income inequality in the state of Alabama, using empirical techniques. Their hypothesis was not supported since the results indicated that manufacturing does not play a key role in income inequality.

Furthermore, their results brought us back to education being one of the most important factors, because the more education in a community, the less income inequality. Additionally, whether you live in a rural or urban area affects income inequality. And finally another fact that

their results proved is that counties with a high African American population tend to have a high income inequality.

Some literature related income inequality to mortality rates, but economists question whether this relationship does not depend on per capita income. Lochner, et al. (2001) analyzed this issue with data from over 500,000 people in the United States, over a 8-year period; and the Gini coefficient was used as the measurement for income inequality. The results showed that the population living in states with high income inequality, have a higher mortality rate; while the population living in the states with low income inequality tend to have a lower mortality rate. They concluded that high income inequality is positively related to a high mortality rate.

Other authors tested whether the relationship between income inequality and mortality might be different because of the level of education or not (Muller, 2002). He used a multiple regression analysis with mortality as the dependent variable, and Gini coefficient (as a measurement of income inequality), income per capita, and the percentage of the population over 18 years without a high school diploma as the independent variables. His data was from 1989 and 1990 for all states, including the District of Columbia. In his model, the independent variable of most interest was the Gini coefficient for households, ranging from 0 to 1 and measuring the level of income inequality. To control the different income levels among states, he included per capita income in his regression model; which was in the log form to reduce positive skew. And, since education is one of the most important factors when talking about income inequality, he measured educational attainment as the percentage of people over 18 years old without a high school diploma.

Firstly, he analyzed a regression model without the independent variable of population over 18 years without a high school diploma. The results showed that income inequality's effect

on mortality was insignificant. But, once he added that independent variable to the regression, the fit of the regression increased significantly.

How about the elderly? A high percentage of the 65 years or older population was projected to go into homelessness from 2010 to 2020. Usually these older adults have critical health and housing needs which cannot be afforded (Sermons & Henry, 2010). The exposure to extreme weather as well as other unhealthy environments in shelters can affect the wellbeing of our elders. The mental health of the elderly is also very important when looking at the reasons why older people end up homeless, and even stay homeless in some cases. An example could be memory loss, an illness that can make the elderly unable to secure housing. They concluded their research with a list of recommendations that would reduce elderly homelessness and even, hopefully, completely eliminate it in the United States.

- The rise of subsidized housing that elderly people find reliable and affordable.
- Generate an adequate and indefinite supportive housing to completely eliminate homelessness.
- Analysis and investigation to achieve a better understanding on what homelessness of the elderly population is.

Tennessee is among the states with the highest income inequality along with Kentucky, Alabama, Oklahoma, and North Carolina. According to the Center on Budget and Policy Priorities (2012), inequality in Tennessee has worsened for over 50 years. After years of widening inequality, Tennessee's upper class households have incredibly bigger incomes than the lower class households. "The richest 5% of households have average incomes 13.4 times as large as the bottom 20% of households and 4.9 times as large as the middle 20% of households".

3.2. Related Literature to Income inequality and Poverty in Central America and South America:

According to OECD (2021), among the 37 OECD (Organization for Economic Cooperation and Development) countries, the United States is top five with the highest income inequality in 2019, with 0.39; behind Bulgaria (0.408), Mexico (0.458), Chile (0.46), and, at the top of the list, Costa Rica (0.478). As shown above, some Latin American countries have a relatively high income inequality, even though there has been a significant progress in reducing it. Alberto González Pandiella (2017) analyzed income inequality in Costa Rica using an income source decomposition approach by Lerman and Yitzhaki (1985), which allowed him to identify the degree of contribution of any income source to income inequality (measured with the Gini coefficient). The decomposition approach of this method is the mathematical expression where the Gini coefficient is shown as a covariance between income and the observations in the distribution curve.

$$Gy = \sum Sk\ Rk\ Gk$$

According to that expression, income inequality can be decomposed into three elements:

- Gk : the Gini coefficient of income source k.
- Sk : the share of income source k in total income.
- Rk : the Gini correlation between income source k and the total income.

In his research, Alberto González Pandiella also looked at inequality by gender, age, and level of education. He concluded that in Costa Rica, income inequality is higher for the youngest and the oldest population. This is because the youngest population has a student status, and the oldest population has a retired status. When looking at income inequality per gender, he observed that inequality is higher for women than it is for men. In the case of Costa Rica, women are more

likely to be poor, or unemployed; therefore they are more likely to be recipients of social assistance programs.

The immigrant population in Costa Rica keeps increasing, specially from Nicaragua. According to Alberto González Pandiella (2017), in 2013, 10% of the population employed were foreign. Immigrants in Costa Rica tend to be low qualified, and women unemployment rates are extremely high, almost double of native women unemployment.

Costa Rica is very committed to its investment in education; but educational gaps are still very noticeable because of someone's socioeconomic status. People with no education or low levels of education have the largest inequality; while the population with technical secondary, tertiary, or graduate higher education have the lowest inequality. This suggests that the more educated you are, the more opportunities you have of finding jobs.

3.3. Related Literature to Income inequality and Poverty in Western Europe:

This inequality is also noticeable in European countries like Spain, especially after the economic crisis from 2008 to 2012. Spain is one of the countries with the highest income inequality in the European Union, after Romania, Bulgaria, and Greece (Otero-Iglesias, 2019). According to Otero-Iglesias, 19% of students in Spain do not finish high school, which is higher than the average in the European Union (11%); and adding up to that, 40% of those students' parents do not have a secondary education diploma. The poor children need to be protected in a better way through income-maintenance schemes, and stimulated outside of school to learn better. If teachers got paid better, they would be more motivated to teach their students, these would learn better and even quicker. Households led by a single woman or single mother, and immigrants are particularly affected by this situation.

Other authors like Carlos Gradín, investigated the reasons why income inequality in Spain is so high, in comparison to other countries in the European Union, which are part of the labor market, like Germany. Spain has had a high income inequality, but when the Great Recession hit, it increased even more (Gradín, 2016). As mentioned before, the economic crisis changed drastically the level of inequality in Spain. Almost 60% of this increase between 2008 and 2012 is related to the decrease in the time households spent in full-time jobs, as well as the additional effect associated with the major loss of jobs in larger working units.

It is very clear to see that inequality in Spain was very high compared to other Europen Union countries, even before the recession. Suddenly, with the outbreak of the Great Recession in 2008, the labor market collapsed, unemployment rose to over 20 percent, especially for the youth, unskilled workers and immigrants (Gradín and Del Río, 2013).

Goerlich, & Mas (2001) research provided methodology and results on inequality factors for the fifty provinces, as well as the seventeen regions of Spain. The data they used was obtained from the Household Budget Surveys for 1973/74, 1980/81, and 1990/91. The main income inequality measurement used in his research was the Gini coefficient; and his independent variables were total income, total expenditure, and monetary expenditure; also expressed as per capita or per household. Their results showed that the provinces located in the south and west of the country are the provinces with the highest income inequality. On the other hand, the provinces with the highest per capita income were the provinces located in the north-east region of Spain. The results showed a significant negative relationship between Gini coefficient and per capita income, indicating that the provinces with the highest per capita income are the provinces with the lowest income inequality. Finally, another finding of their

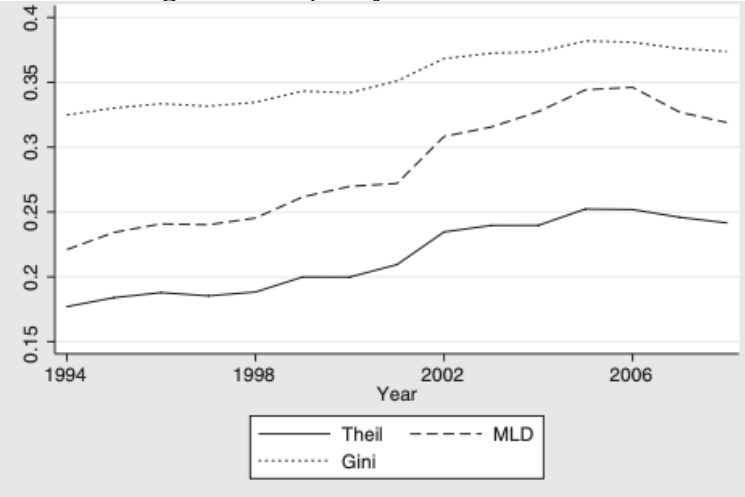
research was that income inequality had a negative impact on the growth of the income per capita of the provinces in Spain.

Biewen, & Juhasz (2012) examined what caused the income inequality in one of the most powerful European economies, Germany. Between 1999 and 2006, Germany experienced a rise in their income inequality and poverty. Furthermore, the country's unemployment levels rose to levels never seen before. The question they addressed on their research was "what factors affected the most to the inequality increase experienced during those years?" Their results showed that the main factor affecting income inequality was the rising inequality in labor incomes.

They showed that from 1999 to 2005 unemployment growth was steep. In 2005, there were around 5 million people who were unemployed in Germany. Once 2006 hit, employment began to rise significantly, while unemployment decreased to the level it was at in 1999. The fact that while unemployment decreased after 2005, but inequality and poverty remained the same, suggests that unemployment may not be the only reason for the rise in inequality between 1999 and 2005.

There have been previous studies that show that the increasing inequality in labor markets affects the increase in inequality. The figure below shows the growth of the inequality in the labor market translated into growing inequality of labor incomes per household. The evolution of this inequality is growing until 2006, where it starts to slightly fall.

Figure 3: Inequality in Labor Income



They concluded their paper by saying that it is important to know whether personal income inequality in Germany is a result of employment/unemployment, or inequality in the labor market. Their results for Germany from 1999 to 2006 showed that the increase in income inequality was due to the increase dispersion in the labor market incomes.

Portugal has also experienced income inequality and poverty for the past 50 years. Teixeira, & Loureiro (2019) used time series data for Portugal between 1973 and 2016. Their paper examined how FDI (Foreign Direct Investment) contributes income inequality and poverty in the long-run. Their results showed that higher flows of inward FDI are related to a lower income inequality and poverty rates; i.e. FDI significantly reduces poverty; which also leads to higher inward FDI flows. In the case of income inequality, the results proved FDI to have no contribution on higher (or lower) income inequality.

3.4. Related Literature to Income inequality and Poverty in Africa:

What are the main factors that may reduce income inequality in Africa? The general literature mentions education as one of the factors that most affect income inequality all around

the globe. Sudharshan Canagarajah (1998) mentioned primary education in Ghana, since it is the highest education that the poor can achieve. In Ghana, per capita income can only increase if one goes through middle school, which the poor cannot afford; and also explains the positive relationship between education and income inequality.

There has been a grand growth in recent years in Africa, but the continent still shows a significant income inequality. Income inequality is mostly seen in all the sub-regions across the continent. However, by implementing government policies, this would lead to the creation of middle classes, which would have effects on lowering income inequality and the level of poverty in African countries (Income Inequality in Africa).

4. The Data and its Properties:

The choice of Fixed Effect vs Random Effect model is used for this panel data. Therefore, before looking at the models, in section 3.1. I present the data set, and in section 3.2. I discuss the data properties.

4.1. The Data Set:

This analysis aims at capturing the effects of changes in different variables on income inequality and poverty. The Gini coefficient was used to measure income inequality, which varies between 0 and 1; the higher the value, the higher the income inequality.

The analysis is focused on annual data from 2000 to 2019. All the data sources are given on Table 6 in Appendix A. In short, the independent variables are the following: educational attainment (at least Bachelor's degree), households led by single mother, minority population, per capita personal income, population over 65 years old, minimum wage, and population over

poverty level. The percentage of minority population is focused on African American, Hispano or Latino, Indian American, Hawaiian, and Asian. The last variable is the dummy variable "DummyRecession", which is 0 if previous to the Great Recession, and 1 if after the Great Recession. Since all the variables except for per capita personal income and income inequality are in percentage form, I calculated the natural logarithm form of these two variables, to see the percentage change.

4.2. The Data Properties:

Firstly, I had to assess the panel data properties of the data, so unit root test was Performed to test for stationarity of my variables. The unit root test used for this data was the Fisher Augmented Dickey-Fuller test. The results of this test are summarized in Table 1. The test indicates that educational attainment, annually (bachelor's degree or higher), lnGini (log form of the Gini coefficient as a measure of household income inequality), Single (percentage of households led by single mothers), Minority (percentage of minority population), lnIncome (log form of per capita personal income), Pop65 (percentage of population over 65 years of age), Poverty (percentage of the population below poverty level), and MinWage (minimum wage) are integrated of order one, I(1).

Table 1: Unit Root Test		
Variables	Fisher Augmented Dickey-Fuller	
	Level	First Difference
EDUCATION	25.41	81.02***
lnGINI	24.20	84.54***
SINGLE	11.49	73.16***
MINORITY	4.94	75.86***
lnINCOME	19.84	55.68***
POP65	7.44	39.34**
POVERTY	7.32	101.12***
MINWAGE	5.37	58.84***

*Note: ** indicates significant at 5% level and *** indicates significant at 1% level.*

The Wooldridge test was also performed to test for autocorrelation in panel data. This test was performed twice, once for each model. The null hypothesis for this test was no first-order autocorrelation. With that being said, Table 2 shows the results for these tests.

Table 2: Wooldridge Test	
Models	Prob > F
Poverty	0.3342
Income Inequality	0.1960

Since both values are insignificant, there is no sign of autocorrelation in either model.

5. The Empirical Analysis:

The main objective of this paper is to estimate the effects on income inequality and poverty during the Great Recession period, as well as seeing whether the Great Recession affected income inequality and poverty by adding a dummy variable. 2 models were used to see the effect of my independent variables on poverty and income inequality separately (Model 1 used for the determinants of poverty and Model 2 used for the determinants of income inequality).

5.1. Methodology:

The analysis is conducted by using Fixed Effect vs. Random Effect models. The Hausman Test was used to decide whether to use Fixed Effect or Random Effect. The Hausman Test shows a null hypothesis on Stata which is that the preferred model is random effects. The alternative hypothesis is that the model preferred is fixed effects; so you would reject the null hypothesis. If the p-value is less than 0.05, the null hypothesis will be rejected. Table 3 shows the results for this test on both models.

The data was picked for 9 southeastern American states from 2000 to 2019. The data used consists of annual data for each state covering 20 years (2000 – 2019). By looking at my variables for my analysis, and also taking into account their unit root properties, the variables included in the model are the first difference of each variable. After using the Wooldridge Test for autocorrelation in panel data, the results showed that there was no autocorrelation between the variables.

Table 3: Hausman Test	
Models	P-value
Determinants of Poverty:	0.1632
Determinants of Income Inequality:	0.0541

5.2. The Models:

5.2.1. Model 1: Determinants of Poverty:

$$POVERTY_{it} = \beta_0 + \beta_1 EDUCATION_{it} + \beta_2 lnGINI_{it} + \beta_3 SINGLE_{it} + \beta_4 MINORITY_{it} + \beta_5 lnINCOME_{it} + \beta_6 POP65_{it} + \beta_7 MINWAGE_{it} + \beta_8 Dummy_{it} + \varepsilon_{it}$$

5.2.2. Model 2: Determinants of Income Inequality:

$$lnGINI_{it} = \beta_0 + \beta_1 EDUCATION_{it} + \beta_2 POVERTY_{it} + \beta_3 SINGLE_{it} + \beta_4 MINORITY_{it} + \beta_5 lnINCOME_{it} + \beta_6 POP65_{it} + \beta_7 MINWAGE_{it} + \beta_8 Dummy_{it} + \varepsilon_{it}$$

The variables' descriptions and sources are depicted in Table 6.

5.3. The Empirical Results:

The results of the Random Effects regressions (model 1 and model 2) from 2000 to 2019 are shown on Table 4 (Random Effect Results for Determinants of Poverty), and Table 5 (Random Effects Results for Determinants of Income Inequality).

Model 1 explains 95 percent of the variation in poverty levels from 2000 to 2019. Firstly, the results for the poverty model (model 1) reveal that the estimated coefficients for educational attainment (Bachelor's degree or higher), percentage of households led by single mothers, and the dummy for the Great Recession are statistically significant at less than 1% level. While the

percentage of population over 65 years of age is statistically significant at less than 5% level. By looking at these results, I can observe that as education attainment increases by 1, poverty decreases by 0.435, as expected. Education is a human capital investment. Education leads to less poverty because when human capital is equipped with better and higher skills, the capability of creating new opportunities increases; there are new jobs. “Access to high-quality primary education and supporting child well-being is a globally-recognized solution to the cycle of poverty. This is, in part, because it also addresses many of the other issues can keep communities vulnerable” (Giovetti, 2020).

The second independent variable that appears to be statistically significant is the percentage of households led by single mothers. When this explanatory variable increases by 1, the percentage of population below poverty level increases by 0.288, which was also expected. In the United States, according to the data from the U.S. Census Bureau, of the 38 million people who are living in poverty in 2018, 56% were women. The pandemic we are living in right now has left families with a higher risk of falling into poverty in the United States, but also all over the rest of the globe. The population is facing a higher economic insecurity, due especially to unemployment, which has especially affected women (Bleiweis, Boesch, & Gaines, 2020).

Thirdly, the percentage of population over 65 years of age resulted on being statistically significant; as the percentage of the elderly population increases by 1, poverty decreases by 0.24. In the United States, poverty for the elderly population started decreasing in the twentieth century. Poverty was once more noticeable for the elderly than any other age group, but today, the poverty level of the elderly is very similar to the middle-aged adult group. What is a big contributor to this decline in elderly poverty? Social Security is often mentioned. In 1935, the

Social Security System showed a steep benefit growth (Social Security and Elderly Poverty, 2004).

Finally, the Great Recession dummy variable is positively significant at less than 1% level. There is a positive relationship between the Great Recession and poverty. This dummy was defined as 0 if before the Great Recession, and 1 if after the Great Recession. With that being said, the results show that poverty increased by 2.476 after the Great Recession. The Great Recession prompted critical and constant drops in wages and employment. Median real household cash income tumbled from $57,357 in 2007 to $52,690 in 2011.1 15.6 million individuals were jobless at the peak of the recession. Poverty expanded from 12.5% in 2007 to 15.1% in 2010 (McCorkell & Hinkley, 2018).

Table 4: Random Effect Results for Determinants of Poverty

	(1)
VARIABLES	POVERTY
lnGINI	14.81
	(10.39)
EDUCATION	-0.435***
	(0.109)
SINGLE	0.288***
	(0.0765)
MINORITY	0.0182
	(0.0399)
lnINCOME	1.513
	(1.715)
POP65	-0.244**
	(0.103)
MINWAGE	-0.304
	(0.195)
DummyRecession	2.476***
	(0.509)
Constant	13.68
	(20.04)
Observations	180
Number of s_id	9
R^2	0.95

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The results for model 2 (determinants of income inequality), shown below on Table 5, indicate that the estimated coefficients for the percentage of households led by single women, and the percentage of population over 65 years old are significant at less than 1% level. The other variable statistically significant is the minority population, which is significant at the 5% level. Income inequality lies between 0 and 1, the higher the value, the higher the income inequality. As the percentage of households led by single women increases by 1, income inequality increases by 0.00182, as expected. In 2009, President Obama signed the Lilly Ledbetter Fair Pay Act as a step toward ending the pay gap between women and men in the United States. There has been progress made since then, but women still make 79 cents for every dollar a man makes; while an unmarried woman makes 60 cents for every dollar a man makes. In the United States, one out of two women live alone (divorced, separated, widowed, or never been married (Unmarried Women and the Wage Gap, 2017). According to the Women's Voices Women Vote, below are some facts regarding women and income inequality and unemployment:

- An unmarried woman is twice as likely as a married woman to be unemployed (3.1% married woman, and 7.3% unmarried woman).
- An unmarried woman is almost four times as likely as a married woman to be living in poverty (5.6% married woman; 21.7% unmarried woman).
- An unmarried woman is over three times more likely to earn minimum wage (13.5% married woman; 45.4% unmarried woman) or below minimum wage than a married woman (15.9% married woman; 49.7% unmarried woman).

The percentage of minority population has a negative effect on income inequality; as the

percentage of minority population increases by 1, the income inequality decreases by 0.000755. This was not expected; my independent variable "percentage of minority population" consisted of African American, Hispano or Latino, Indian, and Asian. White and Asian Americans (who have the highest median incomes, are focused more on professional, managerial, and executive occupations than African Americans, Hispanics or Latinos, or Indian Americans. The fact that I added Asian Americans to the "minority population" was a mistake since they are not considered a minority in this case.

Finally, the percentage of elderly population, which is positively significant at the 1% level, has a positive effect on income inequality, as expected. As the percentage of the elderly population increases by 1, the income inequality increases by 0.00464. The percentage of the population of 65 and above has a positively significant relationship with income inequality. According to the Asian Development Bank Institute, "a 1% increase in the elderly population share leads to a 2.343% increase in the Gini coefficient" (Wang, Wan, Luo, & Zhang, 2017).

Table 5: Random Effects Results for Determinants of Income Inequality

VARIABLES	(2) lnGINI
POVERTY	0.000515
	(0.000480)
EDUCATION	0.00158
	(0.00105)
SINGLE	0.00182***
	(0.000639)
MINORITY	-0.000755**
	(0.000334)
lnINCOME	0.00363
	(0.0125)
POP65	0.00464***
	(0.00117)
MINWAGE	0.00113
	(0.00140)

DummyRecession	-0.00192
	(0.00366)
Constant	-0.950***
	(0.113)
Observations	180
Number of s_id	9
R^2	0.61

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Data availability was the major limitation for this paper. I would have liked to add other variables like welfare, or corruption; but I was not able to find these. Gunalp, Burak. (2008), analyzed the effects of corruption on income inequality and poverty. They defined corruption as the number of public officials convicted in a state for crimes related to corruption. They found robust evidence that an increase in corruption increases income inequality and poverty. (Pettinger, 2017) "Should the government provide more welfare support programs such as child tax benefit and unemployment insurance in order to decrease economic inequality?" Higher welfare programs help to decrease inequality and poverty. Higher welfare programs will give the population with lower incomes a better life. However, there are people who argue that increasing welfare programs may cause people to avoid work or work only a few hours (Pettinger, 2017).

6. Conclusion:

Two random effect models were applied to examine the determinants of poverty and income inequality. Panel data for 9 southeastern states (Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, Oklahoma, Tennessee, South Carolina) from 2000 to 2019 were used in this study.

The results for the determinants of poverty reveal that increases in educational attainment, and the percentage of population over 65 years of age contributed to a decrease in poverty (measured as the percentage of population below poverty level). On the other hand, increases in the percentage of households led by single women contributed to an increase in poverty. The dummy used to represent the Great Recession contributes to a positive effect on poverty, meaning that after the Great Recession, poverty increased.

The results for the determinants of income inequality reveal that increases in the percentage of households led by single women, and the percentage of population over 65 years of age contributed to an increase in income inequality (measured with the Gini coefficient). On the other hand, an increase in the percentage of minority population contributed to a decrease in income inequality.

The way that the yearly rates of change in income inequality and poverty can happen at the same time, brings attention to local governments and policy makers of the need to plan policies and systems that could both lessen poverty and income inequality. By and large most poverty decrease techniques will in general lessen income inequality somewhat, notwithstanding, the methodologies to diminish income inequality don't really diminish poverty. For example, a technique to decrease inequality requires interventions to advance occupation creation and business just as to improve equity in the chance of cooperation in these positions through improved educational levels. There is additionally a need to improve access to these new openings by diminishing sex, pay, and racial discrimination that exist in local labor markets.

References:

(2021, April 05). Retrieved from The World Bank: https://www.worldbank.org/en/country/georgia/overview

(2021). Retrieved from IBISWorld: https://www.ibisworld.com/united-states/economic-profiles/georgia/#EconomicOverview

Alberto González Pandiella, M. G. (2017). Deconstructing income inequality in Costa Rica: An income source decomposition approach. 32.

Annual percent change of the real GDP in Tennessee from 2000 to 2020. (2021). *Statista*.

Arkansas, D. U. (2018). *Data USA*. Retrieved from https://datausa.io/profile/geo/arkansas

Bleiweis, R., Boesch, D., & Gaines, A. C. (2020, August 3). *The basic facts about women in poverty*. Retrieved from Center for American Progress: https://www.americanprogress.org/issues/women/reports/2020/08/03/488536/basic-facts-women-poverty/

Bolden, N., Clark, C., & Agbodzakey, J. (2020). *Manufacturing Matters: A Case Study of Alabama*.

Bureau of Economic Analysis (U.S. Department of Commerce). (2018). Retrieved from Bureau of Economic Analysis (U.S. Department of Commerce): https://www.bea.gov/

Bureau, C. (n.d.). *United States Census Bureau.* Retrieved from https://www.census.gov/topics/income-poverty/income-inequality/about.html

Deavers, Kenneth L. and Robert A. Hoppe. "Overview of the Rural Poor in the 1980s"; pp. 3-20. In Cynthia Duncan (ed). *Rural Poverty in America*. Westport CT: Auburn House, Greenwood Publishing Group, Inc., 1992.

Department, S. R. (2021, January 20). Retrieved from Statista: https://www.statista.com/statistics/374655/gini-index-for-income-distribution-equality-for-us-families/

Duncan, Cynthia. "Persistent Poverty in Appalachia: Scarce Work and Rigid Stratification," pp.111-133. In Cynthia Duncan (ed). *Rural Poverty in America*. Westport CT: Auburn House, Greenwood Publishing Group, Inc., 1992.

Economics, A. C. (n.d.). Retrieved from https://uca.edu/acre/citizens-guide-gross-domestic-product/

Economy of Louisiana. (n.d.). Retrieved from Britannica: https://www.britannica.com/place/Louisiana-state/The-19th-century

Economy of Louisiana. (2014). Retrieved from Britannica: https://www.britannica.com/place/Louisiana-state/The-19th-century

Economy of Mississippi. (2020). Retrieved from Britannica: https://www.britannica.com/place/Mississippi-state/Government-and-society

Economy of Oklahoma. (2019). Retrieved from Britannica: https://www.britannica.com/place/Oklahoma-state/Economy

Facts about Florida. (2013). Retrieved from State of Florida: https://www.stateofflorida.com/facts/

(2014). *Florida's Economic Future & the Impact of Aging.* FLORIDA ALFA Florida Assisted Living Federation of America.

Giovetti, O. (2020, August 27). *How does education affect poverty? It can help end it.* Retrieved from Concern Worldwide US: https://www.concernusa.org/story/how-education-affects-poverty/#:~:text=Access%20to%20high%2Dquality%20primary,to%20the%20cycle%20of%20poverty.&text=Those%20living%20below%20the%20poverty,chance%20of%20living%20in%20poverty.

Gradín, C. (2016). Why is income inequality so high in Spain?

Income Inequality in Africa. (n.d.). Retrieved from African Development Bank: https://www.afdb.org/fileadmin/uploads/afdb/Documents/Generic-Documents/Revised-Income%20inequality%20in%20Africa_LTS-rev.pdf

Lochner, K., Pamuk, E., P. Kennedy, B., & Kawachi, I. (2001). State-Level Income Inequality and Individual Mortality Risk: A Prospective, Multilevel Study.

Mas, F. J. (2001). Inequality in Spain 1973-91: Contribution to a Regional Database.

McCorkell, L., & Hinkley, S. (2018, December 19). *The Great Recession, Families, and the Safety Net.* Retrieved from Institute for Research on Labor and Employment: https://irle.berkeley.edu/the-great-recession-families-and-the-safety-net/

Mississippi - State Economic Profile. (2019). Retrieved from IBISWorld: https://www.ibisworld.com/united-states/economic-profiles/mississippi/

Muller, A. (2002). Education, income inequality, and mortality: a multiple regression analysis.

OECD. (2021). *Income Inequality (indicator). doi: 10.1787/459aa7f1-en (Accessed on 24 March 2021).*

Otero-Iglesias, M. (2019). *Inequality in Spain: let's talk about the poor*. Retrieved from Real Instituto elcano: https://blog.realinstitutoelcano.org/en/inequality-in-spain-lets-focus-on-the-poor/

Pettinger, T. (2017, March 19). *Should welfare benefits be increased to reduce poverty?* Retrieved from Economics.help: https://www.economicshelp.org/blog/7220/economics/should-welfare-benefits-be-increased-to-reduce-inequality/

Priorities, C. o. (2012). Income inequality has grown in Tennessee.

Reardon, S. (2014). Retrieved from Income inequality affects our children's educational opportunities: https://equitablegrowth.org/income-inequality-affects-our-childrens-educational-opportunities/

Salkind, N. J. (2012, December 27). *Random-Effects Models*. Retrieved from ENCYCLOPEDIA: https://methods.sagepub.com/reference/encyc-of-research-design/n360.xml

Sermons, W., & Henry, M. (2010). Demographics of Homelessness Series: The Rising Elderly Population.

SHADAC analysis of income inequality (gini coefficient), State Health Compare, SHADAC, University of Minnesota, statehealthcompare.shadac.org, Accessed 24 March 2021. (n.d.).

Social Security and Elderly Poverty. (2004, September 3). Retrieved from National Bureau of Economic Research: https://www.nber.org/bah/2004number2/social-security-and-elderly-poverty

Sousa-Brown, S. C. (2004). *An empirical analysis of poverty adn income inequality in West Virginia.*

South Carolina. (2019). Retrieved from U.S. News: https://www.usnews.com/news/best-states/south-carolina(2018). *South Carolina Economic Analysis Report.* scworkforceinfo.com.

Statista. (2019). *Percentage of households led by a single mother with children under age 18 living in the household in the U.S. in 2018, by state*. Retrieved from Statista: https://www.statista.com/statistics/242302/percentage-of-single-mother-households-in-the-us-by-state/

Sudharshan Canagarajah, D. M. (1998). The Structure and Determinants of Inequality and Poverty Reduction in Ghana, 1988-92.

Tennessee: Economy. (2012). Retrieved from Infoplease: https://www.infoplease.com/encyclopedia/places/north-america/us/tennessee-state-united-states/economy

The Progress of Education in Louisiana. (1996). Retrieved from Southwest Educational Development Laboratory: https://sedl.org/pubs/pic01/priority.html

Unmarried Women and the Wage Gap. (2017). Retrieved from Women's Voices Women Vote: https://www.wvwvaf.org/what-we-do/awareness/unmarried-women-wage-gap/

Wage and Hour Division. (2020). Retrieved from U.S. Department of Labor: https://www.dol.gov/agencies/whd/mw-consolidated

Wang, C., Wan, G., Luo, Z., & Zhang, X. (2017). *Aging and Inequality: The Perspective of Labor Income Share.* Asian Development Bank Institute.

William Levernier, D. S. (1995). Variation in US. State Income Inequality: 1960-1990 . 24.

Appendix A:

Table 6: Data description and sources		
Variable	Description	Source
Gini	Gini coefficient as a measure for household income distribution inequality, by state	Statista
Education	Educational attainment, annual: Bachelor's degree or higher, by state	Federal Reserve Economic Database (FRED)
Single	Percentage of households led by single mothers, by state	Statista
Minority	Percentage of minority population , by state	U.S. Census Bureau
Income	Per Capita personal income, by state	Federal Reserve Economic Database (FRED)
Pop65	Percentage of population over 65 years of age, by state	U.S. Census Bureau
MinWage	Minimum wage, by state	U.S. Department of Labor
Poverty	Percentage of the population below poverty level, by state	U.S. Census Bureau
DummyRecession	0 = before Great Recession; 1 = after Great Recession	

Table 7: Expected signs of variables

	Expected Sign	
Variable	lnGINI	POVERTY
Dependent variables		
lnGINI		+
POVERTY	+	
Independent variables		
EDUCATION	-	-
SINGLE	+	+
MINORITY	+	+
lnINCOME	+	+
POP65	+	+
MINWAGE	-	-
DummyRecession	+	+

Table 8: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
POVERTY	15.94	2.71	10.8	23.1
EDUCATION	22.98	3.49	16.1	32.5
GINI	0.47	0.009	0.45	0.5
SINGLE	38.95	3.99	32	49
MINORITY	35.34	6.64	21.98	49
INCOME	35221	6849.29	21640	52426
POP65	14.09	2.28	9.5	20.9
MINWAGE	6.74	1.00	3.25	9.25

The following graphs represent the trends of each variable, dependent and independent for all the states used in this paper. The states are shown with numbers in the graphs; below is shown what state each number represents.

1. Louisiana
2. Mississippi
3. Alabama
4. Georgia
5. Florida
6. Oklahoma
7. Arkansas
8. Tennessee
9. South Carolina

Figure 4: Education (at least bachelor's degree)(% of total population), by state

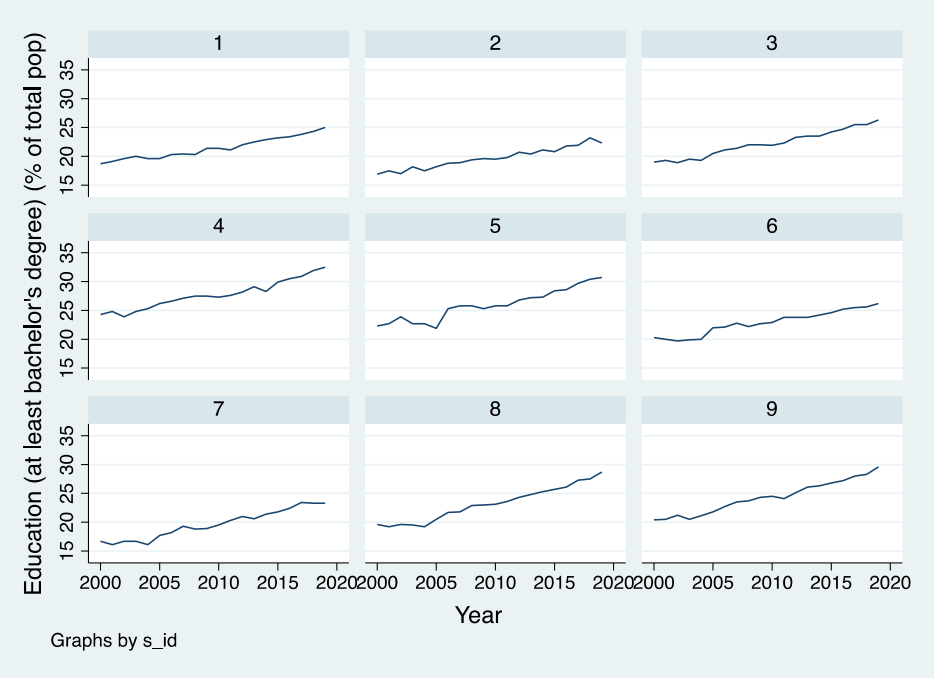


Figure 5: Gini coefficient as a measure for household income distribution inequality, by state

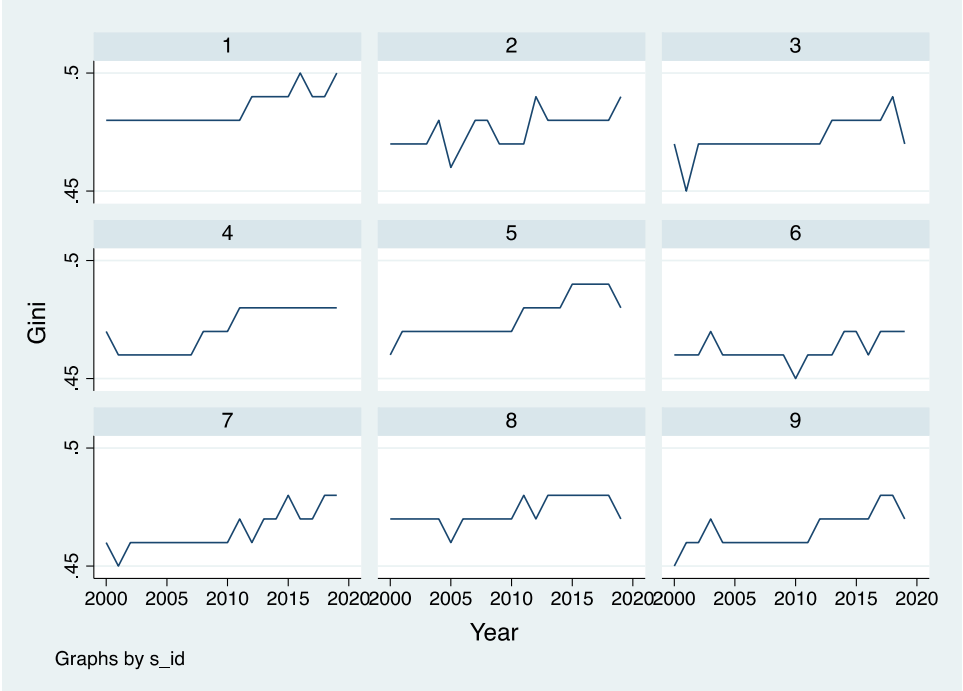


Figure 6: Percentage of Households Led by Single Women, by state

Figure 7: Minority Population (percentage), by state

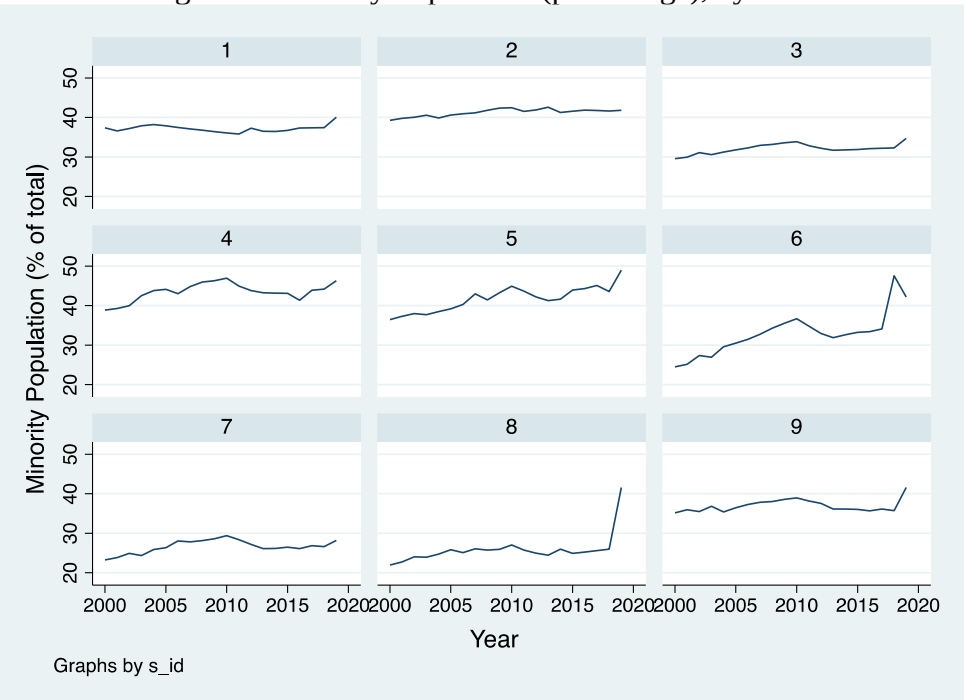


Figure 8: Per Capita Personal Income, by state

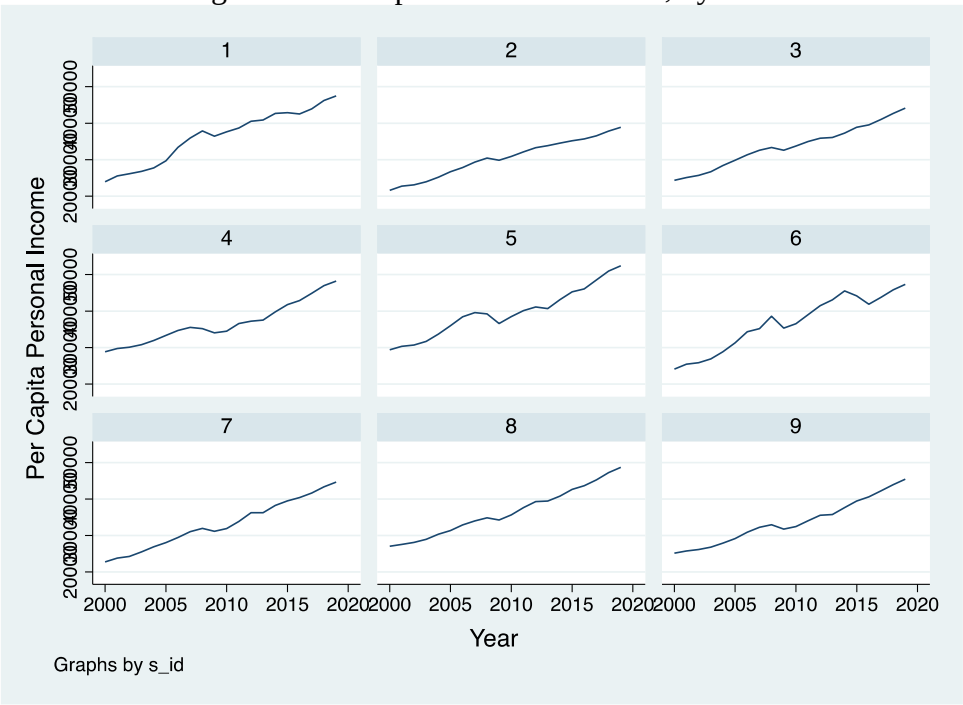


Figure 9: Percentage of the population over 65 years old, by state

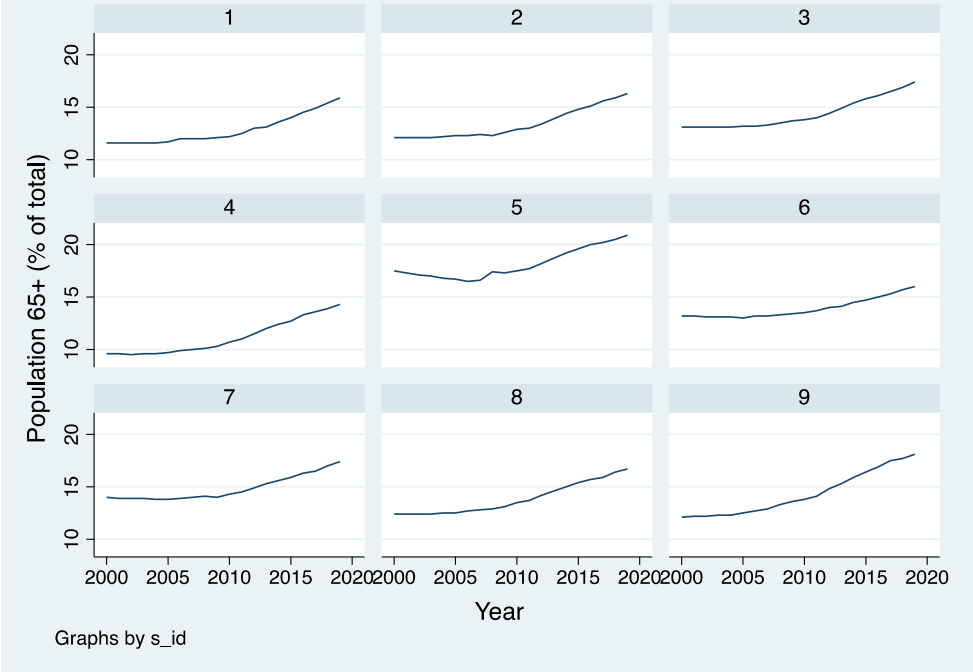


Figure 10: Percentage of the Population Below Poverty Level, by state

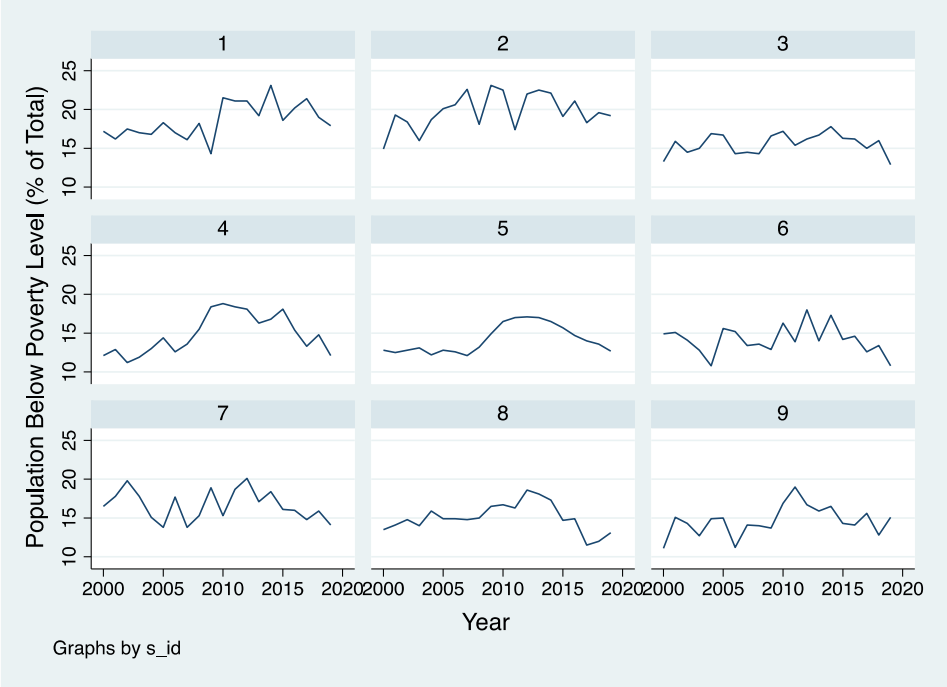


Figure 11: Minimum Wage, by state