DOES FINANCIAL INCLUSION HELP IN ALLEVIATING POVERTY IN UNITED STATES?

CHIN XUE YI
LEE SHUO ZHE
TIEU JAN NIE
YEW YEE MEI

BACHELOR OF FINANCE

UNIVERSITI TUNKU ABDUL RAHMAN
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BY

CHIN XUE YI

LEE SHUO ZHE

TIEU JAN NIE

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DECLARATION

We hereby declare that:

(1) This undergraduate FYP is the end result of our own work and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.

(2) No portion of this FYP has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

(3) Equal contribution has been made by each group member in completing the FYP.

(4) The word count of this research report is 14169.

Name of Student:	Student ID:	Signature:
1. Chin Xue Yi	19ABB03095	
2. Lee Shuo Zhe	19ABB01678	
3. Tieu Jan Nie	19ABB03459	
4. Yew Yee Mei	19ABB04596	

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Last, we would also like to express our gratitude to each member of our group. To complete the research, each group member actively participated in discussions and helped each other. Without the group members' active cooperation and collaboration, we would not have been able to complete this research.

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POV	Poverty Headcount Ratio at $2.15 a day (2017 PPP)
UNEMP	Unemployment
GINI	Gini Index
CREDIT	Domestic Credit to Private Sector
ADRL	Autoregressive Distributed Lag (ADRL) Models
GDP	Gross Domestic Product

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PREFACE

This FYP was completed by a group of Bachelor of Finance (Honours) undergraduate graduates in order to graduate from Universiti Tunku Abdul Rahman (UTAR). This FYP is entitled "Does financial inclusion help in alleviating poverty in United States" and is guided by Mr. Ng Cheong Fatt. With the growth in the world population, the level of poverty has also risen. The period from 1991 to 2019 in the United States is investigated in this study. From 1991 to 2019, the United States experienced a number of serious crises, including the financial crisis, the Great Recession, the unemployment crisis, the housing crisis, and others. All these crises have contributed to the rise of poverty in the United States from 1991 to 2019. Financial inclusion is considered a main driver for reducing extreme poverty as well as boosting shared prosperity. Hence, this study aims to focus on whether financial inclusion may alleviate poverty in the United States and help the public better comprehend the determinants of poverty in the United States. In conclusion, it is hoped that this research project can offer readers and other interested parties' various new insights, individuals may also use this research project as a resource to continue researching and studying relevant subjects for their future studies.

ABSTRACT

This FYP aims to examine whether financial inclusion helps in alleviating poverty in the United States in both long run and short run by considering the independent variables of unemployment, Gini index and domestic credit to the private sector. The tests applied in this FYP are ARDL and pairwise Granger causality test. This FYP applied secondary data by utilising 29 observations based on yearly basis from 1991 to 2019 which derived from World Bank database. The results show that all the independent variables have significant positive relationships with poverty in the United States in the long run. However, the result of domestic credit to the private sector is contrary to most of the past studies which suggested the negative relationship with poverty.

CHAPTER 1: INTRODUCTION

1.0 INTRODUCTION

With the world population increasing, poverty has been increasing also from time to time. The development of financial inclusion has helped to address this issue, but there is still a financially excluded population. This study, therefore, focuses on whether financial inclusion helps to reduce poverty in the United States and the factors that influence it. The background of the study, problem statement, research question and objective, and significance of the study are all included in this chapter.

1.1 BACKGROUND OF STUDY

1.1.1 Poverty in United State

Poor is defined as individuals or families who are unable to maintain the most basic of living standards due to a lack of economic resources. Additionally, it predicts that in 2020, 37 million Americans will live in poverty, or about 11.4 percent of the entire population (Poverty Estimates, Trends, and Analysis, n.d.).

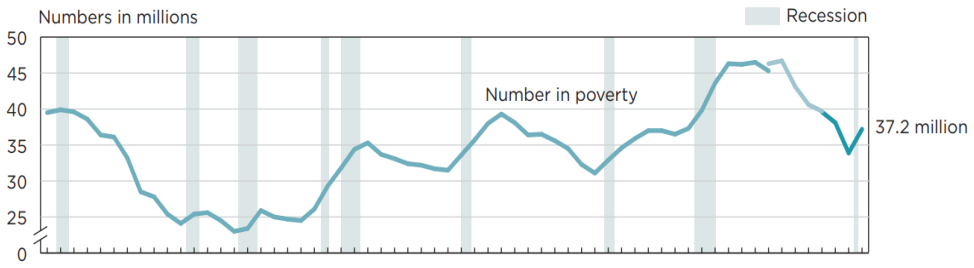

Figure 1.1 Poverty's number using the official poverty measure from 1959 to 2021. Adapted from Bureau, U. S. C. (2022).

According to Fay (2021), U.S. Census Bureau's 2019 Current Population Report thirty-four million Americans, there are 10.5 percent of people who considered to be impoverished. In US, the poverty rate for children was 14.4 percent, the minimum level since 1973, and the rate for people 65 years old and higher was

8.9 percent. Among the poorest group are 24.3 percent of those residing in households headed by women without a husband, 23.7 percent for young people without a high school diploma, 26.4 percent for those who reside in a household where the head is unemployed, and minorities for black people about 18.8 percent. Furthermore, where conditions are much worse and the business never really took off, the South and Southwest of the US are where you can find the actual face of poverty. By taking a two-year average for 2018-2019, there are nine of the ten states with the highest poverty percentage in the U.S. which include Mississippi (19.4 percent of the population that is lower than the poverty line). Louisana is the second highest poverty rate which is 18.4 percent. Others are around 14 percents which are Arkansas, Kentucky, and other states (Fay, 2021).

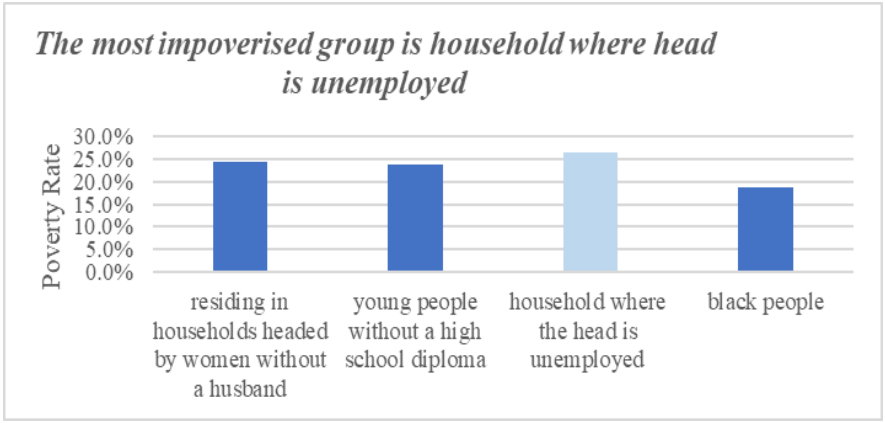

Figure 1.2. The percentage of impoverish group in the United States. Adapted from Fay (2021). Poverty in the United States.

Furthermore, the 2007 financial crisis also created a significant impact on the poverty rate not only in the US but also globally. It creates a severe impact on the Great Recession and the ongoing unemployment crisis. Census Bureau states that the overall poverty percentage rose from 13.2 percent in 2008 to 14.3 percent in 2009. It nearly increases 3.7 million people to the ranks of the impoverished. 33.33 percent of those people were children. The poverty rate among people of working age hit an all-time high of 12.9 percent (Economic Policy Institute, n.d.). In addition, the housing crisis also occurred in 2007. In 2000, the house price in the United States increased very quickly. The Case-Schiller index, which measures national housing values, increased from an index value of 100 in 2000 to 189 in

2006. This sharp growth exceeded the typical rate of rising housing values. However, the housing bubble burst, beginning in 2007 and increasing significantly in 2008. The index's measurement of housing prices decreased in value to 132 in 2008. Therefore, many individuals have lost all of their home equity as a result of the decline in housing prices. Low initial interest rates on adjustable-rate mortgages and low percentage down payments of houses were used to fund a large portion of home ownership. Hence, this causes more hardship for the people and increases poverty in the United States (Vanderslice, 2017).

According to Shierholz (2009), median income fell by 3.6 percent in 2008. It was the largest one-year decline on record since 1967, the poverty rate rose by the greatest amount since 1991. In addition, the unemployment rate increase will also drive up the poverty rate. The figure 1.3 shows that in these three years 2007, 2008, and the average 2019, a 5.1 percentage point rise in the unemployment rate was recorded. In nutshell, the financial crisis in 2007 highly impacted the poverty rate, median income, and unemployment rate in the US.

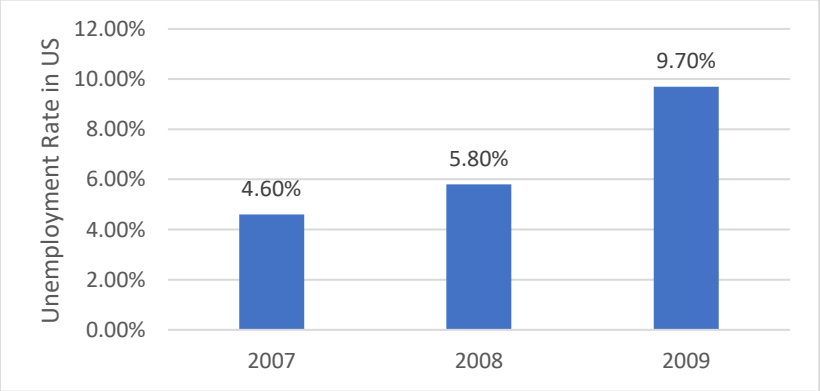

Figure 1.3 The unemployment rate in the United States from 2007 to 2009.

Moreover, poverty in the U.S. is also driven by income inequality in the US. According to Schaeffer (2020), among the G7 nations, the United States has the highest level of income disparity. The U.S. also has high issues of color discrimination, which are black and white. In the U.S., the black-white income gap has persisted over time. From the figure 1.4, we can observe that the difference

between the wealth of white people and black people is large. It will cause poverty among black people to be higher than among white people.

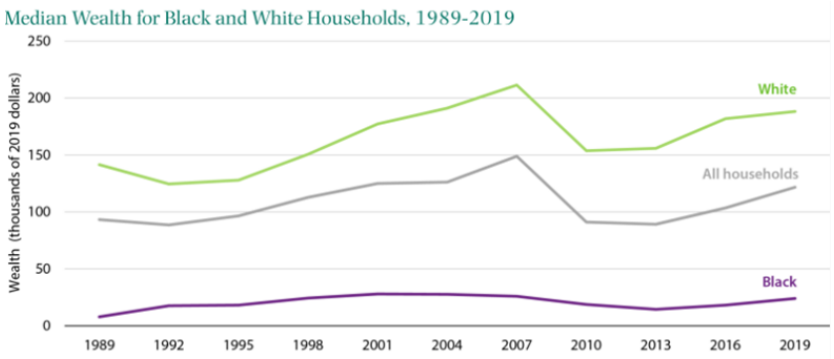

Figure 1.4 The wealth for black and white household from 1989 to 2019. Adapted from Moss et al. (2020). The black-white wealth gap left black households more vulnerable.

1.1.2 Unbanked and Underbanked in United States

According to the FDIC (2017), an unbanked household lacks a checking or deposit account, whereas the household that is underbanked has a bank account but utilizes financial services or products from sources other than banks. According to the Federal Deposit Insurance Corporation (FDIC), in 2017, 25 percent of American households were underbanked or unbanked. According to the survey, more than half of unbanked households cited a lack of funds to keep an account open, 30% did not trust banks, and 9% said banks were inconveniently located (Erincstefanski, 2019).

According to Reed (2014), almost half of Americans have lost a lot of trust in banks, and they do not feel better about Wall Street and mortgage lenders anymore. Therefore, it seems that people typically attribute their changing opinions to personal experiences. It appears that bankers have exhausted all possibilities for the origin of this failing relationship. The quality of banking products and customer

service come in second and third, respectively, demonstrating a recurring theme underlying the rising mistrust.

According to the survey, it states that 9 percent of respondents say that the bank is conveniently located. In addition, due to the COVID-19 pandemic in 2021, U.S. banks reached a record as many retail bank branches closed. The reason is that more consumers are switching to digital banking and the sector has begun to consolidate. The U.S. bank had closed 2927 branches, while it had shut down 4000 branches and opened more than 1000 new ones (Hannahmiao, 2022). The most significant effect is that the citizens who live in poor regions in the U.S. might not be able to access financial services through the banking system or other than the banking system. They might not have a mobile phone.

1.1.3 Financial Inclusion in the United States

The term "financial inclusion" denotes the easy access and affordability of financial services to everyone, focusing on those who are disadvantaged by the conventional financial system. This concept has gained attention globally as a means to promote economic growth, reduce poverty, and improve the overall well-being of individuals and communities. According to the World Bank Group, financial inclusion is considered a main driver for reducing extreme poverty as well as boosting shared prosperity. For example, trading accounts enable the public to save their money and make and receive payments, therefore, to expand financial inclusion in a country, the first step is to make sure the trading accounts are easily accessible to the public (Overview, n.d.). Based on the research from Demirguc-Kunt and Klapper (2013), they stated that financial inclusion is positively associated with economic growth, poverty reduction, and income equality. The study also suggests that access to credit and savings services can have a significant impact on the financial well-being of individuals and communities. However, there are still significant barriers to financial inclusion, including limited access to financial services, lack of financial literacy, and cultural and social factors.

Numerous economic studies have shown that poverty can be costly in many areas of the economy, it will be costly if the public is unable to access to the safety and affordable financial products and services, especially the consumers who have the low-income need to pay more for their purchasing (Whitehouse.Gov., 2016). Based on the report from World Bank, there are approximately 1.7 billion adults worldwide who are ineligible for formal financial services. This report also found that people who are financially excluded are more likely to be poor, female, elderly, and those who live in rural areas (World Bank, 2018). Furthermore, a high poverty country is often linked with low productivity. A study by the International Labour Organization found that low productivity is a major challenge facing the informal economy, which often employs poor and vulnerable workers. This study suggests that improving the working conditions, skills, and productivity of informal workers could lead to higher incomes and economic growth (International Labour Organization, 2018).

Fortunately, financial inclusion in the United States has dramatically improved which helps to eliminate poverty and facilitate prosperity. Compared to 86% in 1989, the percentage of United States households who own a bank account increased to 93% in 2013.

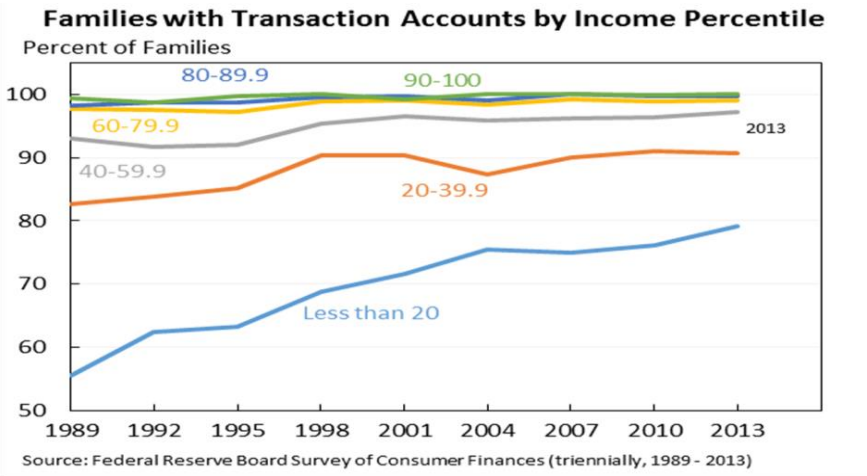

Figure 1.5 Income percentile for the family who hold transaction account from 1989-2013. Adapted from Whitehouse (2016). Financial Inclusion in the United States.

The figure 1.5 shows that only 7% of households in the United States do not hold an account in a bank, while another 20% of households own an account but they supplement it with non-traditional financial products and services. This is mainly due to the improvement in the accessibility and availability of formal bank accounts and financial services in the United States. Besides, the development of Fintech also helps to facilitate the expansion of financial inclusion in the United States. It has a function that can help access a lot of adults who do not own a bank account and also offer specialised financial products and services to the adults who have bank accounts. For example, financial technologies such as "Venmo" and "Zelle" have played an important role in providing innovative financial products and services across the United States (Ozili, 2021).

In addition, in the previous 20 years, financial inclusion in the United States has improved significantly, this upward movement may be continually created by the financial sector's innovations and emerging. Besides, it also allows banked households to receive emerging products and services which can help them to facilitate their overall financial well-being (Whitehouse.Gov., 2016). Furthermore, as many as 800 Community Development Financial Institutions (CDFIs) have been deployed by the United States. The purpose is to increase financial inclusion, especially in poor urban and rural areas. The main concern of CDFIs is to ensure that excluded communities easily access fundamental financial products and services. However, there are still some existing challenges which are due to the consequences of financial inclusion. One of the challenges is that most of the United States with low income prefer to use cash transactions rather than card payments. According to the report, it stated that more than 70% of United States households with a low income prefer to use cash transactions even though more than 70% of United States adults own a debit or credit card (Ozili, 2021). Although the digital payment system in the United States is very well developed, most United States households still prefer to use cash for their daily purchasing activities.

1.2 Problem Statement

In order to pay for even the most basic costs, households in the United States frequently turn to unconventional financial goods and services because they lack access to or opt not to use safe and inexpensive financial services. These alternative services can provide such unbanked and underbanked households with liquidity in the absence of secure and relatively inexpensive banking services ("FINANCIAL INCLUSION IN", 2016). Since many financial products are not specifically made for the underprivileged and disenfranchised, the financial inclusion strategy has not yet produced the desired outcomes. According to Daryl and Amolo (2018), financial services have grown significantly throughout the world, but there is no conclusive proof that this has improved the lives of the poor. Since the rate of poverty has only marginally decreased, Tita and Aziakpono (2017) also show that the current rate of financial inclusion and economic growth primarily impacts a small number of wealthy people. In addition, because of the slow overall pace at which financial products reduce poverty, financial inclusion has not produced the desired outcomes.

During an economic recession or market change, it is hard to find a new job when people lose their existing job. A high level of human capital, or years of schooling, is associated with considerably harder difficulty obtaining employment (Hicks, 2013). When people found their jobs in this period, it should high probability the jobs with lower pay or temporary. This results in people becoming poverty as the job loss or low salary paid. Individuals looking for work are in a state of relative poverty because they have access to the necessities of life. The comparatively poor are nevertheless brought into absolute poverty by unemployment (Filipenco, D., 2022). According to Hinteregger (2017), people's retirement savings in future are plunged when they are obliged to apply funds to pay for expenses today since they have lost their source of income. Future generations face greater pressure to work as current unemployment rates raise the likelihood that they will experience poverty in the coming years. As the influence of unemployed adults, children are forced to leave off studying and work. Lack of completion of the required schooling results in lower human capital levels, which places these children in uncertain employment conditions. These results often lead to intergenerational poverty.

Since the early 1980s, the middle class and the poor people have suffered economically due to the loss of industrial employment and changes in taxes and income distribution laws that have benefited the wealthy (Barlett & Steele, 2002; Wilson, 2009). After adjusting for inflation, the after-tax incomes of the country's richest households rose much more than those of the poorest (Mishel, Bernstein, & Shierholz, 2009). Many people who live in poverty in the United States might not have access to safe working environments, shelter, education, medical, or basic sanitary facilities. They might not be able to defend their legal rights or engage in political activity. Due to their poor income situation, they could also experience prejudice or unfair treatment ("US poverty and", n.d.). Although consumer spending boosts economic growth, as income inequality rises, more wealth is focused at the top of the income scale, where higher earners tend to consume much less than lower earners. Since higher-income individuals will do savings on their extra income, lower-income individuals will spend all their income on necessities of life (Stiglitz, 2013). According to Brown (2017), income inequality raises debt levels because lower-income people loan more to support their cost of living, particularly in an environment with low rates of interest. As the higher debt holding led to unstable, this was a significant factor in the 2008 financial crisis, even though it was not the root cause.

A surplus of global liquidity and a fast growth of credit, especially to the private sector, existed before the global financial crisis of 2008. When the global financial crisis appeared, banks cut back on their financing to the private sector. This is due to banks' efforts to strengthen their balance sheets, hold on to more non-performing loans, and generally reduce risk through deleveraging after the drop in the value of assets. In most of the major economies and national groups around the world, bank lending growth has declined substantially in real terms and is predicted to remain low. Credit in the United States had declined by roughly 10% at the start of 2010. If the individuals and businesses are unable to counter declines in bank lending, they could have to cut back on investment. As the economy deteriorated, credit demand decreased as businesses lowered output and individuals cut back on spending, reducing their demand for financing (Cartas & McConagha, 2010). When banks are more inclined to reduce the number of loans available, individuals and businesses are at a higher risk of poverty as they are unable to access funds for

investment to increase their income. This occurs as a result of the individual and company's diminished investment opportunities or operating capital requirements (Bernanke & Gertler, 1995). If banks just ration firms that are otherwise unable to borrow, these businesses will be forced to pass up lucrative investment possibilities, go through economic burden, or seek for ideas to reduce costs, including payroll (Güler et al., 2021).

1.3 Research Objective

1.3.1 General Research Objective

The purpose of this study is to identify the factors of poverty by highlighting how financial inclusion has helped alleviate poverty rates in the United States. Focusing on the United States as a country, this study uses the World Data Bank's World Development Indicators from 1991 to 2019 to obtain relevant data to understand how these factors affect poverty rates.

1.3.2 Specific Research Objective

1) To identify the impacts of unemployment on the United States' poverty rate.

2) To explore the extent to which the Gini index affects the poverty rate in the United States.

3) To examine the impacts of domestic credit to the private sector on the poverty rate in the United States.

1.4 Research Question

1.4.1 General Research Question

Will the poverty rate in the United States reduce after the Federal Reserve focuses on impoverished areas in the United States?

1.4.2 Specific Research Question

1) What are the impacts of unemployment on the United States' poverty rate?

2) What are the extents to which the Gini index affects the poverty rate in the United States?

3) What are the impacts of domestic credit to the private sector on the poverty rate in the United States?

1.5 Significance of study

This research will provide new insight into the impact of financial inclusion on poverty in the United States. The finding of this examination is expected to redound to benefit individuals and households in rural areas, black Americans, financial services companies, and the government in the United States since Omar and Inaba (2020) stated that financial inclusion is an essential element of social inclusion, and it is especially useful in reducing poverty by opening up previously barred advancement opportunities for those disadvantaged segments of the population.

The adoption of financial inclusion is essentially important to help individuals and households in rural areas. Thus, the rural area population that lives

in or near poverty can manage their money, reduce vulnerability, invest, and diversify their sources of income, by accessing affordable and useful financial products and services. As a result, financial inclusion can protect individuals and households in rural areas from the risk of falling into poverty traps. Besides, adopting financial inclusion is a vital step in guaranteeing the future economic well-being of black Americans. In deep, not only the black Americans will gain from the adoption of financial inclusion, but as well as the entire economy of the United States. This is because when black Americans have more chances to reinvest and accumulate wealth, this would support a higher level of economic activity. Next, when more people start to adopt financial inclusion, it also indicates that banks have more customers, so banks are able to foster profitable growth that is inclusive and rebuild confidence among the users. According to Divya (2014) stated that to achieve an effective financial system in a country, the participation of every citizen in that country is very important due to the financial system facilitates the requirement transaction of people who demand or have a surplus of money and the easiest way to access to the financial system is to adopt a habit of banking. For instance, the entry of black Americans into the financial system will open up new business prospects for financial services firms. Based on the research of Aria, Julien, Shelley, Jason, and Nina (2020) shows that, if the financial products and services is access by the black Americans equally as what the white Americans can access, financial institutions might generate an incremental 2 billion dollars in income each year. Furthermore, the Government of the United States will also benefit when more and more of the citizens in the United States adopt financial inclusion since Stefan and Candace (2013) stated that most Governments have also adopted financial inclusion as a policy goal due to the potential to drive economic growth and alleviate poverty.

Through this study, all the people in the United States will be able to realize the significance of adopting financial inclusion in alleviating poverty. As a result, they will be encouraged to promote the adoption of financial inclusion. If more people realize the importance of adopting financial inclusion and start to adopt it, poverty will be reduced, and the entire economy of the United States will be benefited as well.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

In this chapter, we write up relevant theories, and concepts and make a literature review about the relationship between the dependent variables and independent variables, where the dependent variable is the poverty rate; independent variables are unemployment, domestic credit provided to the private sector, and Gini index. Besides, the theoretical framework will be talk through this chapter.

2.1 Review of Theoretical Framework

With the economic crises first appearing in the late 1980s, African Governments have put economic programs (SAP) in place in collaboration with foreign organizations to resume growth. However, in some nations, GDP expansion has frequently been accompanied by a rise in inequality and poverty. Growth had a favourable effect on poverty and inequality. The author suggested that the link between per capita income and inequality was of the reverse U curve type based on the experience of industrialized nations throughout the Industrial Revolution. In other words, during the early stages of economic expansion, the richest people reaped the majority of the gains and are the ones who hold this inequality (Djialeu, 2016). Bourguignon (2005) states that inequality-growth-poor is a triangle. The author highlights the positive effects of growth on eradicating poverty and the reduction of disparities in eradicating poverty. However, it is still an unclear relationship between growth and inequality. According to Polloni-Silva, Costa, Fernando Moralles, and Neto (2021), it defines that conventional financial services are available to all people and are used by anyone, even the most vulnerable. Thus, it suggests that there are no barriers to financial services that are related to price or other factors. Thus, Carballo (2017) argues that the notion of financial inclusion is expansive, multidimensional, and dynamic. Deriving from the model by Polloni-

Silva, Costa, Fernando Moralles, and Neto (2021), we use the domestic credit provided to the private sector as a financial inclusion variable. We also put the Gini index as our independent variable to assess the relationship with poverty.

2.2. Review of Literature

2.2.1 Poverty

According to Roser and Ortiz-Ospina (2013), the United Nations defines the people who live in the worst conditions as "extreme poverty". The World Bank, part of the United Nations, has set an "International Poverty Line" to measure global extreme poverty and it was revised in 2015. It says that extreme poverty is defined as surviving on less than 1.90 international dollars per day. However, Khawaja and Mowafi (2020) state that the general state of one's income, access to food, clothing, and shelter is used to measure poverty. In addition, according to Schwartzman (1998), this study investigates absolute poverty and relative poverty, two broad definitions of poverty. Absolute poverty is the minimum resources that an individual requires to survive, while relative poverty is the measurement of a population's resources and living conditions in comparison to another. Furthermore, the United Nations (1995) describes general poverty as a complicated factor that includes insufficient income, being unable to ensure a dignified lifestyle due to lack of resources, hunger, deteriorating health and poor healthcare, lack of education, substandard housing circumstances, and social prejudice. Chambers (1995) shows that poverty includes the issues of helplessness, loneliness, and vulnerability. His participatory methodology is based on local perspectives and understandings, and poor people are involved in conceptualizing poverty. In this definition, the dignity, security, justice, or authority derived from social aspects of poverty are given more weight. The consequence of poverty in children will cause five perspectives, which are physical health issues, cognitive outcomes, academic achievement outcomes,

mental outcomes, and others. For instance, health problems, low birth weight, learning disabilities, and high school dropouts (Brooks-Gunn & Duncan, 2000).

2.2.2 Financial inclusion and Poverty Rate

Moreover, according to King and Levine (1993), this study found that financial inclusion and poverty are related both directly and indirectly. Through increased access to credit, insurance, and other financial services, which offer resources for addressing everyday transaction needs for consumption, investment, and general economic growth, financial inclusion directly contributes to the reduction of poverty. Similarly, Demirguc-Kunt, Beck, and Honohan (2008) also state that enhanced financial inclusion has the potential to increase beneficiaries' chances of starting their own businesses, which will increase their income, consumption, level of independence, and ability to participate in family and community decision-making. For the indirect routes, according to Abosedra, Shahbaz, and Nawaz (2015), this research examines the connection between Egypt's financial development and efforts to reduce poverty by using data from 1975 quarter 1 to 2011 quarter 4. It concludes that in the case of Egypt, financial sector development is able to facilitate access to financial services by the underprivileged, including credit and insurance-risk services.

According to Park and Mercado (2018), this study aims to investigate a new index of financial inclusion for 151 economies by combining nine variables of access, availability, and usage and computing weights based on a principal component to examine the significance of financial inclusion on poverty and income inequality. They conclude that high financial inclusion is significant in reducing the poverty rate in high and middle-high economies, but there is no result in middle-low and low-income economies. Furthermore, Polloni-Silva, Costa, Moralles, and Sacomano Neto (2021) examining the combined impact of financial inclusion and technology on levels of poverty and inequality in 13 nations using practical Generalized-Least Squares (FGLS) and Limited Information Maximum

Likelihood (LIML) techniques. They note that poverty and inequality are significantly and negatively correlated with financial inclusion.

On the other hand, William, Adegoke, and Dare (2017) use panel data analysis to evaluate how financial inclusion affected poverty reduction and economic growth in a developing economy from 2006 to 2015. This study concludes that in terms of reducing poverty, financial inclusion did not have an effective way of promoting consistent financial and marketing support, but it can increase profit in commercial bank branches in rural areas with increasing agricultural products and risk reduction.

2.2.3 Unemployment and Poverty Rate

Unemployment is defined as individuals who age 16 or above, are members of the labor force who have the capacity to work and actively looking for a job, but he/she is unable to find a job position. Unemployment is often used as the determination and measurement of the county's economic health, high unemployment in a country indicates that the economy is in a distressed situation while extremely low unemployment may be an indicator that the economy is currently overheating (Ndzwayiba, 2020).

A high unemployment rate often comes together with a high poverty rate, there are a lot of past studies suggest that there is a positive relationship between unemployment and poverty, which means to say that the covariance between these two variables is the same, movement of one variable is determined by the others, no matter is going positive or negative. It can be said that high unemployment will make the poverty become higher, and vice versa. According to Seran (2017), the study stated that the link between unemployment and poverty is significant at the sign value 0.001, and the results of path analysis suggested that the unemployment variable is positively correlated with poverty with the path coefficient value of 0.559. It suggested that a very strong relationship exists in the model. Besides, the study by Muhammad and David (2019), which conducts research between

unemployment and poverty in Nigeria stated that both of these variables are such a twin problem in the economies. The reason is that both of them act on the economy's growth over time. The researcher takes further steps to analyze their relationship by randomly collecting 102 cross-sectional data to generate the result since the relationship between unemployment and poverty is unclear. The result thus showed that there is a proportional link between unemployment and poverty. The proportional link is referring to the equivalent ratio which exists in two variables (Introduction to Proportional Relationships, n.d.). For example, a ratio of 1:8 for unemployment and poverty indicates that 1% rise in unemployment will cause poverty to rise 8%; 2:16 means a 2% increase in unemployment will have a 16% increase in poverty, holding other variables constant.

Furthermore, other research papers are supporting the positive relationship between unemployment and poverty. Corcoran and Hill (1980), the article suggested that the decrease in unemployment will decrease poverty as well. By investigating the households' individuals between the period of the year 1967 to 1975, the researcher gets a result that showed the number of poor would be reduced by about 10%, given that unemployment for the head of the household was being removed. In addition, based on the study from Bourne (2009), the study suggested that unemployment can explain up to 48% of poverty, which means that the correlation between unemployment and poverty is positive. Moreover, according to the research from Loka and Purwanti (2022), the research also has the same perspective which suggests that there is a significant effect and positive relationship between unemployment and poverty. Researchers analyze poverty in Bali province and thus get the result showing that poverty is caused by unemployment. The reason is that the people who lose their jobs will face the problem of decreasing income, and this will force them to lower their previous living standards and live in poverty. Since unemployment will negatively decrease the income of people, therefore it consequently strengthens poverty since people are no longer able to afford the same living expenses with a lower income.

In addition, the relationship between unemployment and poverty is also highly related to the growth of the economy. A decrease in unemployment and poverty cannot run away from the improvement in economic growth, and vice versa.

According to Quy (2016), he states that the rate of economic growth and unemployment are negatively correlated; when the growth rate is greater, the unemployment rate will be lower. Besides, this research also suggested that there is a inversely correlated between poverty and economic growth, meaning to say that if the economy is at a high growth rate, the poverty rate will be lower. It concludes that if a country wishes to reduce its unemployment and poverty rate, the first step is to ensure the economy is being formulated by ensuring the stable performance of the economic growth rate. The research paper from Quy (2016) further suggested that the relationship between unemployment and poverty is positive, the higher the unemployment will lead the wider poverty spread wider. The reason is that generally, very poor people normally refer to people who have no regular job or just own a scattered part-time job.

However, some of the studies argue that the decrease in unemployment will not help to decrease poverty, meaning to say that the relationship is not significant. Based on the study from Agénor (2004), defined that there is also a high possibility for a person who is employed to become poor, which refers to the "working poor". The term "working poor" refers to the individual who earns lower than $1.08 per day which is lower than the international poverty line, and there is a significant increase in a lot of countries in Latin America. Besides, although unemployment is maintained at a relatively low rate, it will not affect the poverty rate to increase. The study showed that the "working poor" in sub-Saharan Africa and South Asia is up to 40%, and the rate in India is even up to 50%, even though there is a low unemployment rate in the country. Moreover, according to DeFina (2004), unemployment has a less significant effect on poverty. No matter whether the person is employed or unemployed, it will not affect them to be poor. The reason suggested by the study is due to the measurement method of poverty. If the measurement threshold of poverty is considered high, then whether or not the individuals are being employed is not much affected by the poverty rate.

In contrast, the research paper further suggested that there may be a negative relationship between unemployment and poverty in some of the situations. The decrease in unemployment will lead to an increase in poverty. According to Agénor (2004), the reason to describe the negative relationship between the variables is

given that the decrease in unemployment needs a simultaneous decrease in real income. The decrease in unemployment and increase in job expansion is because the jobs are paying the income at a lower rate. Therefore, the fall in the real income of individuals then increases the probability of a person living in poverty.

2.2.4 Gini index and Poverty Rate

Gini index is a measure of the income distribution among the population (Bureau, 2021). Inequality of income has typically high degrees in the majority of OECD nations and is continually increasing, as has been thoroughly documented over the past 30 to 40 years (OECD, 2015). Living conditions for those in the middle and bottom quartiles are thought to be stagnant or even declining as a result of rising inequality (and particularly growing concentration at the top). The strong centre on "inclusive growth" and "shared prosperity" among others multilateral organizations, including the OECD and the World Bank, has been largely driven by the belief that the benefits of economic progress have not been distributed equally in emerging economies. These organizations consider increasing inequality as a risk of societal cohesiveness as well as an economic focus with negative impacts on long-run economic growth, poverty, and social mobility (OECD, 2015; World Bank, 2014; Stiglitz, 2012; Stiglitz, 2015; Stiglitz, 2016). Although conceptually different (Atkinson, 1987), poverty and inequality are closely connected since they both describe a lot of manifestations of the same occurrence, like distribution. While poverty concentrates on the bottom of the distribution and is main emphasis with recognizing the poor and compiling this information into an indicator that shows degrees of poverty in a community, inequality takes into account the entire spread of a distribution (Foster et al., 2013).

According to Karagiannaki (2017) and Vizard and Yang (2017), both studies found that income inequality and poverty are positively correlated by using some inequality and poverty indicators. Experimental estimates suggest that higher levels of income disparity are linked with higher poverty rates. This implies that the grow in income disparity will cause poverty increase. However, even if income

inequality is not their primary issue and is rather a secondary concern for them, they may still wish to see it reduced since they believe it causes or worsens poverty. If so, actions are necessary to reduce inequality on a practical level in order to ultimately alleviate poverty ("Understanding the relationship", 2019).

In studies on income distribution, the terms inequality and poverty are often used interchangeably. Poverty is thought to rise in response to rising inequality and vice versa (Beker, 2020). According to Besley and Burgess (2003), there is a direct and positive correlation between inequality and the extent of poverty in a nation. However, as Honohan (2004) indicates, the link is almost tautological: if average income remains constant, more people are likely to be poor since the rich are taking more of the national income, leaving less for the rest of the population. According to Martin Feldstein (1999), policies should target poverty rather than inequality. He makes the observation that the Pareto principle is manifestly satisfied by modifications that raise the earnings of those with high incomes without lowering those of others. The impoverished may feel poorer as if they had lost some of their money, despite the fact that they are not in a worse situation relative to wealthier people.

As was said before, there is a scientific connection between income inequality and poverty. Absolute poverty can be reduced significantly for a given level of wealth by making slight changes to income distribution (or the degree of inequality). Alternatively, growth is a quantitative provision for poverty alleviation for a given level of inequality (Bourguignon, 2004; Deininger and Squire, 1997; Dollar and Kraay, 2001). But it could be emphasized that most study in the literature on global development applies an absolute sense of poverty when discussing this subject. Even when poverty is calculated relative to income, it is still plausible that rises in economic inequality cause equivalent increases in poverty. If all the measures occur exceed the median, it is equally likely that poverty won't change along with increases in income inequality. In contrast, if top incomes fell while median incomes rose or vice versa, poverty may rise without inequality rising. With such a definition, the definite degree of wealth and hence a significant portion of the evolution progress are no longer relevant. Only relative income or pure distributional characteristics are significant. Even when the conditions of living for

the poor have improved, adjusting the poverty line in relation to average salaries can reveal growing inequality. Although there seems to be less disagreement among economists about the importance of absolute living standards as dictated by incomes and more agreement that relative deprivation matters, there is disagreement about the idea that Individual welfare is solely dependent on one's social standing (Bourguignon, 2004).

Similar to how inequality is measured, poverty development is described by a variety of indicators. The relative risk of poverty is the main metric. This shows the percentage of individual whose comparable household income is lower than 60% of the corresponding year's and country's median equivalised household income. We can see how the poor's living standards vary in relation to changes in the median living standards by using relative poverty risk as an indicator. Relative poverty risk is frequently criticized for acting as an indicator of inequality and thus tracking changes in relative inequality because relative poverty lines differ with living standards (Förster & Vleminckx, 2004).

Poverty reduction is hindered by inequality. The rate at which growth achieves poverty alleviation is affected by income gap (Ravallion, 2004). Growth is less effective in reducing poverty in countries where there is high inequality to begin with, or where the distributional pattern of growth is more favourable to the non-poor. In addition, rising income inequality increases the vulnerability of a greater percentage of the population to poverty since economies are always vulnerable to different kinds of shocks that impede growth.

Examining inequality and poverty within countries across time is another technique to examine the connection between poverty and income inequality. The benefit of this technique is that it allows us to connect changes in inequality and poverty to changes in the labour marketplace, systems of social security, and the macroeconomic environment in every nation. As a result, we are better able to comprehend the underlying causes of the observed connection (Karagiannaki, 2017). The expansion of poverty and income inequality can be attributed to a number of national governmental, societal, as well as international economic variables. According to OECD (2011), the widening wage and salary gap is the most important direct driver of rising inequality in the United States and other

OECD countries. Compared to the majority of other OECD nations, the inequality between the wealthy and poorest 10% of full-day workers has widened by nearly a third. Other socio-demographic trends, such as the increased prevalence of single-parent and single-parent homes and the increase in persons who have a partner in the same income bracket, were also discovered to play a small but significant influence. These factors in the US only contributed to around 13% of the rise in household income inequality, according to OECD (2011). Comparatively, the same OECD analysis found that the expanding income disparity among males was responsible for almost 46% of the general rise in inequality, while the rise in employment among both men and women offset the trend toward greater inequality.

Although income inequality in the United States is receiving more attention, some experts contest the mounting evidence that it contributes to the country's high poverty rate. According to Feldestein (1999), not all income inequality entails a break with the Pareto principle. He emphasizes that the Pareto principle is satisfied by the majority of income disparity. In other words, certain people benefit while no one else does when the income gap widens as a result of rising high-income persons' earnings without diminishing the incomes of other people. Caputo (1995) asserts that the debate over the proper method for assessing alterations in the income distribution among workers and households is a contributing factor in the growing disbelief of the evidence of income inequality.

The following nations were the subjects of Timothy Smeeding (1991) cross-country comparative studies on inequality and poverty: the United States, Australia, Canada, the Netherlands, Switzerland, the United Kingdom, Israel, Germany, Norway, and Sweden. He computed adjusted disposable income by the adult equivalency scale and three distinct inequality metrics (Atkinson, Theil, and Gini index) using household disposable earning. Different forms of families were used for those in poverty and those who were close to it (all individuals, single persons, single parents with kids, couples with and without kids, older couples, and older singles). In all metrics of income inequality (for both modified and unmodified earnings), according to his research, the United States ranks first, accompany by Australia and Canada, with Norway and Sweden having the lowest levels of inequality.

In addition, Kwan Kim (1997) run an inter-regional comparative research of poverty and income inequality for the years 1979 to 1994. Western Europe and North America, Eastern Europe, East Asia, sub-Saharan Africa, and Latin America were the main geographic areas of Kim's research. The United States is once again shown to be the most unequal in its examination of data on the inequality of income and poverty among industrialized or developed nations. While East Asian nations did not experience an increase in income disparity or poverty during this time, countries with economies in transition in Central and Eastern Europe, many Latin American nations, as well as Africa did. It can be argued, according to Kim, that for developed countries, interregional disparities are caused by the connections between changes in labour and capital markets in the domestic economy and changes in the worldwide economy in terms of technology, trade and capital flow, and vice versa. This is true even though the causes of interregional disparities vary by country. Furthermore, he argues that the grow in inequality and poverty seen in a lot of developing nations between 1979 and 1994 is also attributable to the negative effects of globalization in the context of rapid development of advancing technologies, which improved the need for workers who were greater educated and trained.

2.2.5 Domestic credit to private sector and poverty rate

According to Trading economics (n.d.), domestic credit to the private sector is financial resources that financial institutions supply to the private sector, which include loans, the acquisition of non-equity instruments, and other receivables that give rise to a claim for repayment. Credit given to state-owned businesses in various countries is among these claims. Deposit money banks and monetary authorities, as well as other financial institutions for which data is available, are included among the financial institutions. Besides, another example of financial corporations also includes, for instance, lending institutions, insurance companies, pension funds, and foreign exchange firms. There are also some research papers showing that domestic credit to the private sector has a strong connection with the poverty rate.

According to Anthony, Hadrat, George, Kwasi, and Samuel (2021), poverty reduction is inversely correlated to domestic credit to the private sector. This shows that lending to the private sector supports the company to grow and expand its business, at the same time, this will employ more people and help individuals to overcome poverty. In addition, the research from Bakari et al. (2019) investigates how the reduction of poverty in SSA is impacted by financial inclusion using a model of static panel data (fixed effect and random effect). According to the study, government spending, savings (32.5%), the ratio of credit to the private sector to GDP (11.7%), information technology (49.1), ATM accessibility (27.4%), and inflation (96.1), all are important factors in SSA's poverty reduction. Besides, the research from Begum and Aziz (2019) also stated that domestic credit stimulates economic activity by shifting funds from financial intermediaries like banks to individuals and businesses for personal use and investment. Hence, the study indicates that domestic credit to the private sector contributes significantly to an economy's productivity, which in turn lowers unemployment and poverty level. Then, according to the findings from EBOI (2015) stated that the reduction of unemployment in Cape Verde and Cote d'Ivoire is greatly aided by financial development, represented by domestic credit to the private sector by financial institutions.

Based on the research done by Dagume (2021), the researcher found that in South Africa, poverty is significantly and negatively impacted by the quantity of domestic credit lending to the private sector. This is because the private sector has a significant influence on how many jobs are available. Since more jobs lead to lower poverty rates, hence, domestic credit to the private sector and poverty has a negative relationship. Besides, it also stated that domestic credit to the private sector has a negative long-run relationship with the poverty rate. In addition, the research from Begum and Aziz (2019) also stated that the most crucial determinant in the growth of the economy is credit provided to the private sector. It is essential for boosting investment, creating jobs, boosting productivity, and alleviating poverty.

Furthermore, the research from Akhtar, Liu, and Ali (2017) stated that poverty is negatively impacted significantly by the domestic credit to the private sector. In Pakistan, employment is primarily caused by the private sector. An

increase in domestic credit to the private sector will lead to expansion in business, and hence employment increases, which ultimately reduces the poverty rate. Therefore, the study concluded that there is a negative correlation between poverty and domestic credit to the private sector. Moreover, by looking into the research from Maroua and Slim (2021), they found that the domestic credit to the private sector by a bank (percentage of GDP) has a significant impact on reducing poverty. Their study shows the domestic credit provided by banks to GDP is negative and strongly correlated with the poverty gap. Then, based on the research done by Jianu (2017), the researcher also stated that poverty alleviation and domestic private-sector credit are closely related.

In addition, the research from Appiah, Frowne, and Tetteh (2020) stated that poverty is negatively and significantly impacted by financial developments, as evidenced by domestic credit to private sectors as a proportion of GDP and liquid liabilities as a percentage of GDP. The findings can be explained by the fact that a percentage rise in financial development significantly lowers the rate of poverty. Next, the findings are consistent with the research from Odhiambo (2009), who using cointegration and ECM estimations claimed that the development of financial and economic expansion Granger lead to a reduction in poverty, or the procedure of reducing poverty in South Africa is influenced by financial development and growth. In the same way, Dhrifi (2015) also stated that in developing a country, a reduction in poverty is correlated with high levels of financial development.

Besides, Pasuhuk (2018) stated that the study shows a statistically significant negative association between poverty and financial development metrics like the percentage of credit to gross domestic regional product, indicating the significance of financial access and financial depth in alleviating poverty in Indonesia. Both the micro and the macro level, financial sectors have an impact on poverty. In the microeconomic standpoint, the accessibility of household to products of microfinance, including deposits and credits could improve the income of households under certain circumstances, such as regular behavior of saving and the utilization of credit for business purposes. From a macroeconomic standpoint, the existence of financial institutions could stimulate greater savings level in a nation, increasing the amount of money available for the granting of credit to

various business sectors of the economy and boosting investment in new firms. As a result, the investments will help to reduce poverty by opening up employment chances. Based on the research done by Yaya (2017), the autoregressive distributed lag model (ARDL) was used to evaluate the relationship between financial deepening, economic growth, and the alleviation of poverty in nine African countries. The findings indicate a long-term relationship between the variables in eight nations with GDP and financial depth positively affecting poverty reduction in five nations such as Cote d'Ivoire, Benin, Cameroon, South Africa, and Gabon.

However, in contrast, Dilawar et al. (2012) have found a positive relationship between domestic credit and poverty in Pakistan. Then, the research from Azra, Dilawar, Elsa, and Jan (2012) also stated that by applying the autoregressive distributed lag model (ARDL), the result shows that domestic credit to the private sector has a long-run relationship with per capita consumption in alleviating against poverty. However, by using the Error Correction Model, the result shows that domestic credit to the private sector is positively linked and has a short-term association with per capita spending in terms of poverty reduction. In a similar study, Benjamin (2012) applied the 2SLS to investigate how financial development affects the elimination of poverty in emerging countries. According to the study, expanding the deposit opportunities and fund availability is more helpful in alleviating poverty than private credit. In addition, Muhammad (2014) seeks to investigate the presumptive causal relationship between the expansion of the financial sector, the growth of the economy, and the alleviation of poverty in Nigeria. The Autoregressive Distributed Lag model (ARDL) is used in the investigation. The study's empirical findings show the development of the financial sector does not lead to a reduction in poverty. This indicates that a rise in the amount of loanable money available as a result of financial sector expansion is insufficient to guarantee the reduction of poverty.

Then, based on the study done by Yinusa and Alimi (2015), they investigate the relationship between the development of financial, and income inequality and the reduction of poverty in Nigeria. In this study, the Johansen Cointegration test and error correction model was used to examine whether the short-run relationship's error correction model and long-run relationship's presence are both present. The

results showed that financial development does not eliminate poverty. Moreover, based on the research done by Dauda and Makinde (2014). They use the vector autoregressive (VAR) model to examine the connection between the growth of the financial industry and the decline in poverty in Nigeria. Contrary to common belief, the result shows that credit to the private sector does not lower the rate of poverty in Nigeria. This is due to the incorrect attitude of Nigerian financial intermediaries, who do not appropriately diverted funds to the economy's pro-poor sectors. Besides, Fowowe and Abidoye (2011) examine how the expansion of private credit affects the levels of poverty and inequality in Sub-Saharan African nations. The result indicates that private credit does not influence poverty significantly. Nonetheless, empirical evidence indicates that macroeconomic determinants like low inflation and trade openness can lower poverty. Besides, based on the research done by Quartey (2008) discovered that although the expansion of the financial sector has a positive impact on poverty reduction, however, the impact is minor since the financial intermediaries do not appropriately diverted funds to the economy's pro-poor sectors. This is mostly due to government deficit funding, a lack of collateral, a high default rate, and a lack of appropriate business proposals.

2.2.6 Summarized table of LR

Independent Variable	Literature Review			Hypothesis
Unemployment	**Positive Relationship**	**Not Significance**	**Negative Relationship**	Positive Relationship in long run
	Seran (2017) Muhammad and David (2019) Corcoran and Hill (1980) Bourne (2009) Loka and Purwanti (2022) Quy (2016)	DeFina (2004)	Agénor (2004)	
Gini Index	OECD (2015) World Bank (2014) Stiglitz (2012) Stiglitz (2015) Stiglitz (2016) Atkinson (1987) Foster et al. (2013) Karagiannaki (2017) Vizard and Yang (2017) Beker. V. A. (2020)	-	-	Positive Relationship in long run

	Besley and Burgess (2003) Honohan (2004) Bourguignon (2004) Deininger and Squire (1997) Dollar and Kraay (2001) Ravallion (2004) OECD (2011) Kwan Kim (1997)			
Domestic credit to private sector	Azra, Dilawar, Elsa and Jan (2012) Benjamin (2012) Dilawar et al. (2012) Dauda and Makinde (2014) Fowowe and Abidoye (2011) Muhammad (2014) Quartey (2008) Yinusa and Alimi (2015)	-	Akhtar, Liu and Ali (2017) Anthony, Hadrat, George, Kwasi, Samuel (2021) Appiah, Frowne, and Tetteh (2020) Begum and Aziz (2019) Bakari. et al. (2019) Dagume (2021) EBOI (2015) Maroua and Slim (2021) Odhiambo (2009) Pasuhuk (2018) Yaya (2017)	Negative Relationship in long run

CHAPTER 3: METHODOLOGY

3.0 Introduction

We will use the Autoregressive Distributed Lag (ARDL) Model to investigate the impact of unemployment, the Gini index, and domestic credit provided to the private sector on the poverty rate in the United States for this study in this chapter. The equipped methodology in a summary of the research design and the econometric model are also included in this chapter. The econometric model will be created by using time-series data starting from the year 1991 to 2019 in the United States.

3.1 Econometric Model

We use an econometric technique to investigate how financial inclusion affects the reduction of poverty in the United States by incorporating independent variables such as the unemployment rate, Gini index, and domestic credit provided to the private sector. Similar studies on the role of financial inclusion in reducing poverty and income inequality in Latin America were conducted by Polloni-Silva, da Costa, Moralles, and Sacomano Neto (2021). Since there are only time effects and one country is taken into account, time series data is used, and the models were formulated as follows:

$$Pov_t = f(Unemployment_t, Gini_t, Credit_t)$$

$$lnPov_t = \beta_0 + \beta_1 \ln Unemployment_t + \beta_2 ln\ Gini_t + \beta_3 ln\ Credit_t + \varepsilon_t$$

Where,

t = Period (1991 - 2019)

$ln\ Pov_t = Poverty\ headcount\ ratio\ at$ \$2.15 $a\ day$ (2017 PPP) (% $of\ population$)

$ln\ Unemployment_t = Unemployment, total$ (% of $total\ labor\ force$) ($national\ estimate$)

$ln\ Gini_t = Gini\ index$

$ln\ Credit_t = Domestic\ credit\ to\ private\ sector\ (\%\ of\ GDP)$

$\beta_0 =$ Constant

$\beta_1\ to\ \beta_3 =$ Estimated coefficients for each variable

$\varepsilon_t =$ The Residual

3.2 Unit Root Test

The study applies Augmented Dickey-Fuller (1981) (ADF), Phillips-Perron (PP), and Ng and Perron to examine the stationarity of time series. Time series is considered non-stationary if the ADF value is smaller than the critical value, and vice versa. However, ADF is not very powerful, it cannot reject the null hypothesis which is non-stationary. PP can be used to verify the decisions in this case. ADF and PP possess an identical null hypothesis, and the asymptotic distribution of PP is also the same as the test statistic of ADF (Nkoro & Uko, 2016).

3.3 Autoregressive Distributed Lag (ARDL) Models

The study used a well-known methodology developed by Pesaran et al. (2001) known as the Autoregressive Distributed Lag (ARDL) model in predicting and separating long-term relationships from short-term dynamics. They were first proposed by Granger (1981) and relate to the link between cointegration and error correlation models due to vector autoregressive incompatibility of various variables. A further extension of these model estimates was investigated by Engle & Granger (1987), who proposed a simple but not entirely efficient two-step estimation method in the same order of integration as I (1). Another well-known cointegration technique is Johansen and Juselius (1990), which can be used for large samples but with the same order of integration.

The ARDL model is the best econometric approach compared to other methods when the variables are fixed at the order I (0) or integrated at the order I (1). The lags of both the dependent variable and the explanatory factors are used as regressors in ARDLs, which are standard least squares regressions (Greene, 2008). Although ARDL models have been employed in econometrics for many years, Pesaran and Shin's (1998, PS (1998)) and Pesaran, Shin, and Smith's (2001, PSS (2001)) work have made them more well-known as a technique for studying cointegrating relationships between variables.

The ARDL method uses the ordinary least square (OLS) method for cointegration between variables and is suitable for generating both short-run and long-run elasticities simultaneously for a small sample size Duasa (2007). The order of the variables' integration is flexible with ARDL. For evaluating the long-run relationship between non-stationary series and re-parameterizing them into Error Correction Models (ECM) in applied econometrics, ARDL models or constraint tests for cointegration have emerged as the preferred method.

3.3.1 ARDL Bound Test

3.3.1.1 Cointegration Test

This test is to model a time series to maintain the integrity of its long-run information and determine whether it is a meaningful long-run link in the model. Using the Autoregressive Distributed Lag Model (ARDL) method to test cointegration will help to provide realistic and valid evaluations, which is efficient to determine the cointegration variables in the model. However, ARDL cannot be used if multiple cointegrating vectors exist in the model (Nkoro & Uko, 2016).

H_0: *No cointegration*

H_1: *Cointegration*

3.3.1.2 Error Correction Term

According to Alogoskoufis and Smith (1991), error correction terms refer to the relationships in the long run. If the coefficients for error correction terms are significant and are negative figures, it implies that there is long-term causal relationship. In addition, if the coefficients in both models are significant, it means that there is a presence of bidirectional causality.

3.3.2 Diagnostics Tests

The errors in the model are found using a variety of diagnostic tests. For example, it is tested for heteroskedasticity, autocorrelation, misspecification of the functional form, and so on.

3.3.2.1 Histogram and Normality Test: Jarque-Bera Test

The Jarque-Bera statistic for determining normality is shown along with a histogram and descriptive statistics of the residuals. If the residuals are normally distributed, the Jarque-Bera statistic should not be significant, and the histogram should be bell-shaped. The assumption of normality is necessary for many tests, including the t-test and F-test. So, to ensure normality and the correctness of our test results, the Jarque-Bera test usually performed prior to these tests (Stephanie, 2021).

H_0: *Error terms are normally distributed.*

H_1: *Error terms are not normally distributed.*

3.3.2.2 Serial Correlation LM Test

The Breusch-Godfrey serial correlation LM test measures the autocorrelation of a regression model's errors. A test statistic is obtained from the residuals from the model under study in the regression analysis ("Breusch Godfrey serial", n.d.).

H_0: No serial correlation problem

H_1: Serial correlation problem

3.3.2.3 Heteroskedasticity Tests

When modelling financial time series with time-varying volatility, Autoregressive Conditional Heteroskedasticity (ARCH) models are used. According to ARCH models, volatility clustering results from a relationship between the variance of the present error term and the magnitude of the error terms from earlier periods ("Breusch Godfrey serial", n.d.).

H_0: There is no heteroskedasticity in the model.
H_1: There is heteroskedasticity in the model.
Significance level: 0.05
Decision rule: Reject H_0 if p-value less than significance level of 0.05. Otherwise, do not reject H_0.
Decision Making: Reject H_0 when the p-value is lower than 0.05.
Conclusion: There is evidence of heteroskedasticity in the model.

3.3.2.4 Ramsey's RESET Test

The RESET test was proposed by Ramsey (1969), and it is used to assess the significance of currently included regressors or to find missing variables in a regression model (Sapra, 2018). LS estimators will be biased and inconsistent under

these specification flaws, invalidating traditional inference techniques if the model is misspecification.

3.3.2.5 CUSUM and CUSUMSQ test

The research applied the cumulative sum (CUSUM) and cumulative sum of square (CUSUMSQ) tests to verify that the long-run relationships between variables exist (Brown et al., 1975). These tests, according to earlier study (Pesaran & Shin 1999; Pesaran et al. 2001), show the ARDL model's high degree of fitness. The residual of Error Correction Models (ECM) is plotted using these tests. The outcomes stated that the the coefficients of the ARDL model are stable if the statistics in the graph are below the critical value at the 5% level of significance.

3.4 Granger Causality Test

Granger causality test often known as G-causality is a quantifiable concept of causality or directed impact for time series data in the short-run analysis. The fundamental tenet of causality test is that B "Granger causes" to A if B includes information that improves upon past information about A's ability to forecast its future. When a new time series is added to improve the regression and signal prediction, it is quantified by the relative change in model error (Roebroeck, 2015).

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

Research analysis is processed using 29 years of data, from 1991 to 2019 to examine the relationship and significance between the poverty headcount ratio at $2.15 a day (2017 PPP) and unemployment, domestic credit provided to the private sector, and Gini index in the United States. The data is derived from the World Bank Data, and it is generated using the E-views software.

4.1 Descriptive Analysis

The descriptive analysis describes the relationship and trend on the poverty and independent variables in the United States by showing the mean, median, skewness and so on.

Table 4.1 Summary of each variable's descriptive statistic

	POV	**CREDIT**	**GINI**	**UNEMP**
Mean	-0.1819	5.1121	3.7013	1.7330
Median	0.0100	5.1784	3.7038	1.7102
Maximum	0.1823	5.3296	3.7257	2.2649
Minimum	-0.6931	4.7727	3.6376	1.3002
Std. Dev	0.2949	0.1675	0.0202	0.2622
Skewness	-0.6544	-1.0023	-1.5597	0.4190
Kurtosis	2.0549	2.6636	5.8231	2.3615
Jarque-Bera	3.1492	4.9924	21.3883	1.3412
Probability	0.2071	0.0824	0.000023	0.5114
Sum	-5.2755	148.2504	107.3371	50.2577
SumSq. Deviation	2.4342	0.7853	0.01140	1.9247
Observations	29	29	29	29

The descriptive statistic for each variable in this research is shown in Table 4.1. For the study, the average value of the poverty headcount ratio at $2.15 a day (POV) was -0.1819%, the average value of domestic credit provided to the private sector (FI) was 5.1121%, the average value of Gini Index (GINI) was 3.7013% and the average value for unemployment was 1.7330%.

From the summary of descriptive statistics, the median for all the variables is very close to their mean, except for the POV. This demonstrates that there is no outlier in the data. The POV is quite far from their mean, which may indicate that it has an outlier in the observation. The overall standard deviation for all the variables has a low value. This indicates that the data have low variability and are more reliable. All variables have a negative skewness, except for UNEMP. Variable with negative skewness indicates that it has long left tails and more value concentrated on the right side, while positive skewness indicates that it has long right tails and more value concentrated on the left side. In addition, the p-value for JB-test for all the variables is larger than 0.05, this indicates that all the variables' error term is normally distributed.

4.2 Unit Root Test

Table 4.2 Summary of unit root test result

	Unit Root Test					
Variable	**Augmented Dickey-Fuller (ADF)**		**Phillip Perons (PP)**		**Ng Peron**	
	Level	**First differences**	**Level**	**First differences**	**Level**	**First differences**
POV	-1.9865	-6.2743**	-1.9865	-6.4283**	-7.8615	-12.8694**
	(0.5832)	(0.0000)	(0.5832)	(0.0000)		
	(0)	(0)	(0)	(3)	(0)	(0)
CREDIT	-1.4071	-5.4887**	-1.3282	-5.4826**	-3.0558	-13.2868**
	(0.8365)	(0.0001)	(0.8595)	(0.0001)		
	(0)	(0)	(1)	(2)	(0)	(0)

UNEMP	-2.9718	-3.4418**	-1.4445	-2.9513*	-20.6344**	-19.9194**
	(0.1578)	(0.0185)	(0.8245)	(0.0527)		
	(1)	(1)	(1)	(1)	(1)	(1)
GINI	-4.7508**	-6.2424**	-4.7508**	-6.7654**	-9.0579	-12.9619**
	(0.0037)	(0.0000)	(0.0037)	(0.0000)		
	(0)	(0)	(0)	(6)	(0)	(0)

Notes: Figures without bracket indicates the test statistic values. First bracket indicates the p-value. For Ng Perron, the figures indicate MZa. Lag length selection for ADF test is based on SIC. The maximum lag length allowed for ADF test and Ng Peron is 6. The optimal lag lengths of ADF and bandwidth selections of PP are reported in third bracket. The bandwidth selections and the spectral estimations in PP test are based on Newey-West and Bartlet kemel approach. For Ng Peron, the bracket indicates the optimal lag lengths. * Indicates the rejection of null hypothesis at 10%. ** indicates the rejection of null hypothesis at 5%.

The outcomes of each variable's stationarity test for the time series are displayed in Table 4.2. All the variables, such as poverty rate, unemployment, and domestic credit provided to the private sector have unit roots, except for the Gini index at the current level. The reason is only the Gini index rejects the null hypothesis at 5%. Then, all the variables became stationary at first differences I (1). As a result, we can conclude that poverty, unemployment, domestic credit provided to the private sector, and the Gini index are all integrated into the order I (1) processes. Therefore, autoregressive distributed lag (ARDL) models can be applied.

4.3 Empirical result of Autoregressive Distributed Lag (ARDL) Models

Table 4.3 Results of long-run estimates, cointegration analysis, and diagnostic statistics.

ADRL	United State
	ADRL (1,0,2,2)
Panel A: Long-run estimates	
LNCREDIT	0.9866**
	(0.0009)
LNGINI	10.9002**
	(0.0009)
LNUNEMP	0.2317**
	(0.0115)
Constant	-45.9837**
	(0.0001)
Panel B: Cointegration Analysis	
ECT (-1)	-0.9212**
	(0.0000)
Bound F-test	7.5500**
Panel C: Diagnostic statistics	
JB	0.9307
	(0.6279)
LM	1.3921
	(0.1528)
ARCH	0.2721
	(0.5893)
RESET	0.9129
	(0.3527)
CUSUM	S
CUSUMSQ	S

Notes: Figures without bracket is test statistic value, while with brackets is p-value. In panel A and ECT (-1), figures without bracket are coefficient. Bound F-test is used to detect whether there is cointegration relationship. JB test is the Jarque-Bera Test to test whether the error term is normality. LM is the Lagrange Multiplier test to the presence of serial correlation. ARCH is the autoregressive conditional heteroskedasticity to test whether the error variance is constant. RESET is Ramsey Reset Test to test the misspecification. CUSUM test and CUSUM of square test is to test the stability of the parameter. S represents stable. ** indicates the rejection of null hypothesis at 5%.

In panel C, the diagnostic checking on the linear models through JB, LM, ARCH, RESET, CUSUM, and CUSUMSQ. For the JB test, it shows that the error term is normally distributed. For LM tests, the result shows that there is no serial correlation in the model. It indicates that the least square estimates are efficient, such as having the smallest variance and good standard errors. For the ARCH test, the result shows that the model does not have heteroscedasticity. It indicates that the error term's variance is constant. For the Ramsey Reset test, it indicates that the model does not have omitted variable. In addition, the CUSUM test and CUSUM square test indicate that the variance or parameter is stable as the movement in both tests falls inside the critical lines.

4.3.1 Long Run Analysis

The result shows that unemployment, the Gini index, and domestic credit to the private sector have a long-run effect on the poverty rate in the United States. This is because all the variables showed a significant positive long run relationship with the poverty rate.

Unemployment

In panel A, we can see that the relationship between unemployment and poverty rate in the United States is positive. The relationship is significant at the level of 5 percent. This means that if there is a 1% increase in unemployment, the poverty rate will increase by 0.2317% in the long run, holding other variables constant. The reason is that unemployment will decrease the income of individuals, and in the end, it will also decrease the degree of societal wealth (*International Journal of Economics, Business and Accounting Research (IJEBAR)*, n.d.). As more and more people get unemployed and reduce in income, the poverty rate will increase in the United States as collective incomes become lower. This is also aligned with the research from Rehman et al. (2022), since one of the primary reasons for poverty is unemployment, rising unemployment rates should also raise the level of poverty. As unemployment increases, poverty levels eventually increase.

Gini index

In panel A, it shows that there is a significant positive relationship between the Gini index and the poverty rate in the United States. When the Gini index increases by 1%, the poverty rate will increase to 10.9002% in the long run, holding other variables constant. This is aligned with the research from Amar, Idris, Pratama, and Anis (2020) but it includes economic growth factors. The study indicates that it has a positive effect on poverty levels but it depends on the level of income inequalities. When income inequality is low, the level of poverty decreases more with economic development and vice versa. According to Ogbeide and Agu (2015), there is an indirect connection between inequality and poverty through factors like growth and employment. Poverty increases during the early stages of economic development when the economy is improving, and inequality is rising. Those impacted by the increasing inequality are therefore classified as poor and the negative impact of growth on inequality also causes poverty to rise.

Domestic credit to the private sector

In panel A, we can observe that the relationship between domestic credit to the private sector and the poverty rate in the United States is positive. The relationship is significant at the level of 5 percent, and when domestic credit to the private sector increases by 1%, the poverty rate will increase to 0.9866% in the long run, holding other variables constant. The result is contrary to common belief. Despite the fact that the majority of studies agree that there is an adverse relationship between domestic credit to the private sector and the poverty rate. However, the outcome of our findings is a positive relationship. This is similar to the research of Dauda and Makinde (2014), it shows that credit to the private sector does not reduce Nigeria's poverty rate. This is due to the incorrect attitude of Nigerian financial intermediaries, who do not appropriately diverted funds to the economy’s pro-poor sectors. Then, according to Quartey (2008) also stated that despite the fact that the expansion of the financial sector helps to reduce poverty, however, the impact is minor since the financial intermediaries fail to divert funds adequately to the economy’s pro-poor sectors for several reasons, such as the government deficit funding, borrower lack of collateral to pledge when wishing to borrow money, high default rate of the borrower and lack of appropriate business proposals.

In addition, another reason that increasing the domestic credit to the private sector will increase the poverty rate in the United States is due to the financial crisis from 2007 to 2008. According to Duignan (2023), low lending regulations and cheap credit drove a housing bubble, resulting in the 2008 financial crisis. The cheap credit and low lending regulations have encouraged many people to take out loans that they cannot afford. Banks started to make negligent loans to people who lacked the real financial capacity to repay the mortgages they had been given. The ultimate consequence of this was the grouping and transmission down the line of subprime loans. Then, lending banks started to run into financial trouble as the quantity of subprime loans rose to an unmanageable level and a large portion went into default. This led to the financial crisis from 2007 to 2008. The housing market was severely impacted by the crisis, and bankruptcies and bank failure began within a few months. Consequently, the stock market plummeted, and several large firms failed, losing millions of dollars. This led to huge unemployment and prolonged periods of unemployment around the world. As a consequence, it increased the poverty rate in the United States (Loo, 2023). Therefore, we can observe that the more domestic credit to the private sector, the higher the poverty rate in the United States.

4.4 Short Run Analysis

Table 4.4 Result of Pairwise Granger Causality Test

Granger Causality between two variables	F-statistic	Probability	Remark
CREDIT does not granger cause on POV	0.74660	0.4856	No causality
POV does not granger cause on CREDIT	0.2868	0.7534	No causality
GINI does not granger cause on POV	0.9074	0.4181	No causality
POV does not granger cause on GINI	5.2947	0.0133**	Causality
UNEMP does not granger cause on POV	0.4346	0.6530	No causality
POV does not granger cause on UNEMP	0.2655	0.7693	No causality
GINI does not granger cause on CREDIT	2.4309	0.1112	No causality
CREDIT does not granger cause on GINI	2.8095	0.0819	No causality
UNEMP does not granger cause CREDIT	0.9079	0.4180	No causality
CREDIT does not granger cause UNEMP	3.4118	0.0512*	Causality
UNEMP does not granger cause GINI	0.9898	0.3876	No causality
GINI does not granger cause UNEMP	0.1602	0.8530	No causality

Note: * indicates the rejection of null hypothesis at 10%, ** indicates the rejection of null hypothesis at 5%.

The table indicates that there is no causality relationship between CREDIT and POV in the short run. The probability for CREDIT and POV and the probability for POV and CREDIT are greater than 0.05 respectively, which are 0.2592 and 0.9659. The result shows it is insignificant at the level of 0.05.

There is a one-way relationship between POV and GINI. This can be shown from the value of probability for GINI and POV being larger than 0.05, and the value of probability for POV and GINI is smaller than 0.05. Bourguignon (2005) states that inequality-growth-poor is a triangle. To lower rates of extreme poverty, the economy must expand. The growth that helps everyone equally will reduce the degree of absolute poverty (McKnight, 2019). According to Beker (2020), he states that if income distribution stays the same or gets better over time, economic development lowers poverty. But if economic inequality increases along with growth, poverty might not be getting better and might even get worse. GINI does not granger cause of POV. High inequality offers motivations to put in more effort, make riskier investments, and take on challenges in order to benefit from high rates of return. Because the wealthy are less likely to spend, greater inequality encourages overall savings and consequently capital accumulation (Kaldor, 2010).

Moreover, there is no relationship between UNEMP and POV in the short run. The probability for UNEMP and POV and the probability for POV and UNEMP are larger than 0.05 respectively, which are 0.6010 and 0.7236. This indicates there is not significance in the short run.

According to the table above, we can see that there is no causality relationship between GINI and CREDIT. This can be shown by both the probability for GINI and CREDIT being larger than 0.05 respectively, which are 0.1114 for GINI and CREDIT and 0.0881 for CREDIT and GINI. The result is significant at the level of 0.05.

Besides, there is only a one-way causality relationship between UNEMP and CREDIT. The probability of UNEMP and CREDIT is larger than the level of 0.05, which is 0.4045. This means that unemployment does not granger cause CREDIT. Then, the probability for CREDIT and UNEMP is 0.0490, which is smaller than 0.05. This indicates that CREDIT will granger cause UNEMP at the

level of 0.05 and there is a causality relationship between CREDIT and UNEMP. According to Begum and Aziz (2019), domestic credit stimulates economic growth by shifting capital from financial institutions like banks to individuals and businesses for private consumption and investment. Increasing an economy's capacity for production plays a crucial role in lowering unemployment and poverty rate. Similarly, based on the research done by EBOI (2015) in Cape Verde and Cote d'Ivoire, also stated that it is crucial for banks to provide domestic credit to the private sector to lower unemployment. Likewise, Moreno (2004) also indicated that domestic banks are essential for lower unemployment and boosting productivity as they provide credit and financing to the private sector. Hence, we can conclude that CREDIT will granger cause UNEMP.

Besides, there is no causality relationship between UNEMP and GINI. This can be shown by both the probability for UNEMP and GINI being larger than 0.05 respectively, which are 0.3876 for UNEMP and GINI and 0.8530 for GINI and UNEMP. The result is significant at the level of 0.05.

CHAPTER 5: DISCUSSION, CONCLUSION, AND IMPLICATION

5.0 Introduction

This chapter will conclude our study by using the empirical result from chapter 4. We also discuss the implications of the study and research gaps. Recommendations for future directions will be included to give future researchers a few suggestions to help them better comprehend the financial inclusion help in alleviating poverty in the United States.

5.1 Discussion of Key Findings

In our study, we can draw a conclusion from all the variables. Our results identified all the variables that have a long-run positive relationship and are significant to explain the poverty rate in the United States by using the ADRL model. Therefore, these findings have confirmed our hypothesis in these three independent variables have an impact on the poverty rate in the United States. However, most of the other research shows that domestic credit provided to the private sector has a negative relationship with poverty, but our result is a positive long-run relationship. Lastly, in the pairwise granger causality test, only two pairs of variables have a unidirectional relationship and others have no granger cause in the short run. First is poverty to Gini index. Beker (2020) states that if income distribution remains the same or gets better over time, economic development will reduce poverty. But if economic inequality increases along with growth, poverty might increase or get worse. Second is the domestic credit to the private sector to unemployment. Domestic credit can stimulate economic growth by shifting capital from financial institutions to individuals and business for private consumption and investment (Begum & Aziz, 2019). Therefore, companies will employ more people and the unemployment rate will reduce.

5.2 Implications of the Study

Our study indicates that the poverty factors such as unemployment and the Gini index can be mitigated by financial inclusion in the United States. By reducing the poverty rate in the United States, the economic condition will be greater. This is important to government and financial services and product providers to provide a good development and implementation of financial inclusion to the public. By applying financial inclusion, a developed country like the United States can be outperformed among countries in near future. However, domestic credit to the private sector cannot reduce poverty since the results showed that there is a positive relationship.

The result of the long-run analysis indicates that the more domestic credit that is provided to the private sector, the greater the poverty. Due to the financial crisis of 2008, the banks began lending more money to the people without a systematic system as housing prices rose suddenly. Low bank regulations allow them to provide loans with no limitations to people who decide to buy houses to earn abnormal profits. Unfortunately, the housing price dropped due to the housing bubble burst, and this made the borrowers unable to repay the loans to banks in a short time. It is recommended that policymakers tighten up the rules and regulations for banks to lend money or provide loans to people. In order to assess the creditworthiness of a borrower, banks can use the 5Cs of credit, namely character, capacity, capital, collateral, and conditions. Policymakers must ensure that borrowers with good credit scores and histories are able to successfully apply for loans from banks.

The findings show that there is still a minor percentage of households that still do not have a bank account even though financial inclusion is well-developed in the United States. In the past, formal traditional financial institutions have refrained from serving rural communities or have been unable to do so. It is recommended that policymakers take more efforts in encouraging financial institutions to make attractive offers to address the unbanked, underbanked, or financially excluded. In the 21st century, there are still unbanked people in the United States. Especially those who live in rural areas or low-income persons, may enjoy financial services and get the benefit. By boosting household income and providing adequate employment, policymakers should ensure that financial inclusion can help rural poor people (“Developing the Rural”, 2019).

Besides, our research stated that a large number of households, especially low-income households in the United States prefer to use cash transactions even though more than half of them own a debit or credit card. The reason may be people have to worry about the credit limits if using a debit or credit card since cash transactions are only a traditional financial method to exchange items. This shows that financial products and services are not acceptable to households. The poverty issue may become serious as people not fully utilized the benefit of financial inclusion. Therefore, this is a signal to the policymakers to expand the access and

utilization of high-quality financial products and services for underserved persons through the invention, adoption, and worldwide advocacy of sustainable and inclusive policies (“Alliance for Financial”, n.d.).

Furthermore, our results imply that financial inclusion has an important role in alleviating poverty as most of the factors on poverty are able to explain the effects of poverty. Policymakers must put in place measures to eliminate barriers to financial inclusion if they are going to lower the region's poverty rates. In this sense, attempts to broaden financial inclusion must be supported by initiatives that encourage inclusive growth. The function of microfinance is becoming more significant. Making credit more accessible to low-income groups and improving their access to financial services to enable them to engage in productive activities and manage their expenditures in the face of transient downside risks (Park & Mercado, 2015).

5.3 Limitation of Study and Recommendations for Future Directions

5.3.1 Limitation of Study

There are still some limitations in our study although our research produces an impressive result. Firstly, the limitation of this study is that the findings are only applicable and useful in the United States. It may not be appropriate for other researchers to apply in other countries. This is due to the fact that different countries have varied socioeconomic statuses, cultures, backgrounds and other factors that influence the poverty rate within the country itself. Although the findings are significant and reliable in the United States, it may have different results when applied in other countries. As a result, the findings of this study cannot fully

represent the effect of financial inclusion on overall poverty reduction in other countries.

Additionally, another limitation in this research paper is lack of independent variable to indicate financial inclusion. Our research data is sourced from the World Bank's World Development Indicators (WDI). Initially, we intend to conduct this research by using the independent variable of "Commercial bank branches" to indicate financial inclusion. This study covers a lengthy time period, from 1991 to 2019. However, data for "Commercial bank branches" is missing for the years 1991 to 2003. Hence, we have had to switch to another independent variable to indicate financial inclusion, which is "Domestic credit to the private sector".

5.3.2 Recommendations for Future Directions

Firstly, future direction should investigate whether the findings are generalizable to other countries or regions with diverse cultural, economic, and political circumstances. This can be done by conducting comparative studies that examine the similarities and differences in financial inclusion patterns across different countries and regions. Moreover, it encourages the future researchers to combine the techniques of quantitative and qualitative to collect and analyse the data. This method can give a person an expanded perspective of financial inclusion in a specific nation that the researcher wants to investigate. Qualitative methods, such as interviews or focus groups, can help to identify the barriers and challenges to financial inclusion, whereas quantitative techniques, like surveys or data analysis, can support the assessment of financial inclusion level and its influence on the reduction of poverty.

Secondly, regarding the missing of yearly data on the independent variables, the future researchers can try to use alternative techniques that are better suited to this type of data. For example, panel data analysis techniques can help to identify trends and relationships over time and across different geographical areas, even when data is missing for certain years. Besides, if possible, future researchers can

try to find out other independent variables that are more appropriate to analyse the financial inclusion. Furthermore, they also can try to use alternative data sources to estimate trends in financial inclusion such as household surveys and so on.

Moreover, as our findings suggest that domestic credit to the private sector has a positive relationship with poverty rate, which is contrary to common beliefs. Domestic credit is one of the indicators of financial inclusion, thus, it may be a signal that there is a possible non-linear relationship between financial inclusion and poverty. It doesn't mean that higher financial inclusion provided in the country is necessarily good. Future researchers can try to run the non-linear analysis in order to have a more comprehensive investigation on the relationship between financial inclusion and poverty.

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APPENDICES

Appendix 1: Descriptive statistic

	POV	CREDIT	GINI	UNEMP
Mean	-0.181914	5.112084	3.701278	1.733026
Median	0.010000	5.178408	3.703768	1.710188
Maximum	0.182322	5.329580	3.725693	2.264883
Minimum	-0.693147	4.772743	3.637586	1.300192
Std. Dev.	0.294850	0.167470	0.020176	0.262179
Skewness	-0.654406	-1.002306	-1.559710	0.418994
Kurtosis	2.054892	2.663624	5.823097	2.361478
Jarque-Bera	3.149183	4.992372	21.38831	1.341171
Probability	0.207092	0.082399	0.000023	0.511409
Sum	-5.275496	148.2504	107.3371	50.25774
Sum Sq. Dev.	2.434223	0.785298	0.011398	1.924658
Observations	29	29	29	29

Appendix 2: Long run bound test

ARDL Long Run Form and Bounds Test
Dependent Variable: D(POV)
Selected Model: ARDL(1, 0, 2, 2)
Case 2: Restricted Constant and No Trend
Date: 04/17/23 Time: 15:52
Sample: 1991 2019
Included observations: 27

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-42.35934	10.59088	-3.999605	0.0008
POV(-1)*	-0.921181	0.157006	-5.867183	0.0000
CREDIT**	0.908795	0.293235	3.099207	0.0062
GINI(-1)	10.04104	2.918526	3.440448	0.0029
UNEMP(-1)	0.213432	0.085912	2.484297	0.0230
D(GINI)	6.100376	1.904069	3.203863	0.0049
D(GINI(-1))	-2.256880	1.432519	-1.575463	0.1326
D(UNEMP)	-0.122141	0.153158	-0.797482	0.4356
D(UNEMP(-1))	0.216374	0.169679	1.275195	0.2185

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CREDIT	0.986554	0.248679	3.967187	0.0009
GINI	10.90018	2.748387	3.966028	0.0009
UNEMP	0.231694	0.082342	2.813789	0.0115
C	-45.98373	9.109336	-5.047978	0.0001

EC = POV - (0.9866*CREDIT + 10.9002*GINI + 0.2317*UNEMP - 45.9837)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	7.550010	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66
			Finite Sample: n=35	
Actual Sample Size	27			
		10%	2.618	3.532
		5%	3.164	4.194
		1%	4.428	5.816
			Finite Sample: n=30	
		10%	2.676	3.586
		5%	3.272	4.306
		1%	4.614	5.966

Appendix 3: Error correction form

ARDL Error Correction Regression
Dependent Variable: D(POV)
Selected Model: ARDL(1, 0, 2, 2)
Case 2: Restricted Constant and No Trend
Date: 04/17/23 Time: 15:53
Sample: 1991 2019
Included observations: 27

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GINI)	6.100376	1.186796	5.140204	0.0001
D(GINI(-1))	-2.256880	1.047206	-2.155143	0.0449
D(UNEMP)	-0.122141	0.120290	-1.015392	0.3234
D(UNEMP(-1))	0.216374	0.115548	1.872587	0.0775
CointEq(-1)*	-0.921181	0.135616	-6.792566	0.0000

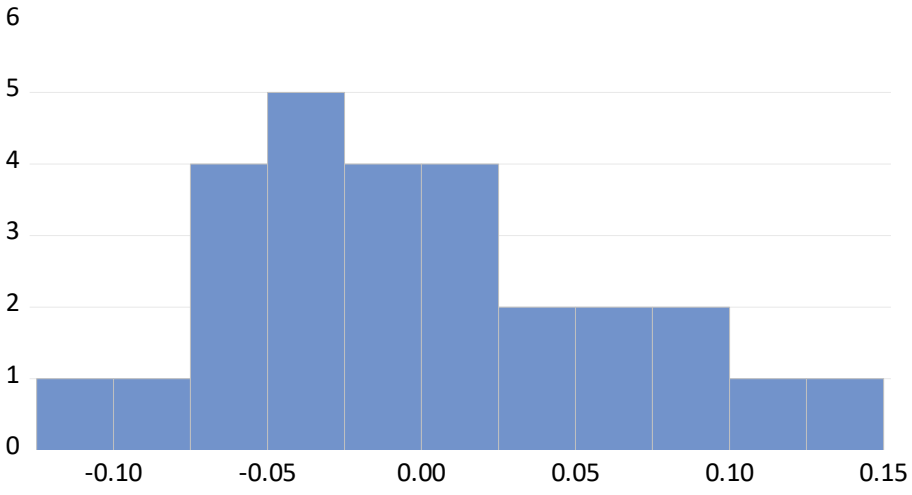
R-squared	0.690323	Mean dependent var	0.026042
Adjusted R-squared	0.634018	S.D. dependent var	0.115714
S.E. of regression	0.070003	Akaike info criterion	-2.314990
Sum squared resid	0.107808	Schwarz criterion	-2.075020
Log likelihood	36.25237	Hannan-Quinn criter.	-2.243635
Durbin-Watson stat	2.340882		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	7.550010	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66

Appendix 4.: Normality Test



Series: Residuals
Sample 1993 2019
Observations 27

Mean	-2.89e-15
Median	-0.005431
Maximum	0.143387
Minimum	-0.121760
Std. Dev.	0.064393
Skewness	0.407743
Kurtosis	2.597204
Jarque-Bera	0.930671
Probability	0.627925

Appendix 5: Serial Correlation LM test

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 1 lag

F-statistic	1.392060	Prob. F(1,17)	0.2543
Obs*R-squared	2.043578	Prob. Chi-Square(1)	0.1528

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 04/17/23 Time: 15:54
Sample: 1993 2019
Included observations: 27
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
POV(-1)	0.172325	0.213208	0.808249	0.4301
CREDIT	-0.204004	0.337713	-0.604075	0.5538
GINI	-0.862919	2.020669	-0.427046	0.6747
GINI(-1)	-0.552212	1.681561	-0.328393	0.7466
GINI(-2)	-0.150784	1.422919	-0.105968	0.9168
UNEMP	-0.018737	0.152347	-0.122992	0.9036
UNEMP(-1)	-0.014376	0.254738	-0.056434	0.9557
UNEMP(-2)	-0.022981	0.168987	-0.135992	0.8934
C	6.976147	12.03062	0.579866	0.5696
RESID(-1)	-0.389927	0.330487	-1.179856	0.2543

R-squared	0.075688	Mean dependent var	-2.89E-15
Adjusted R-squared	-0.413654	S.D. dependent var	0.064393
S.E. of regression	0.076562	Akaike info criterion	-2.023325
Sum squared resid	0.099648	Schwarz criterion	-1.543386
Log likelihood	37.31489	Hannan-Quinn criter.	-1.880614
F-statistic	0.154673	Durbin-Watson stat	1.977586
Prob(F-statistic)	0.996342		

Appendix 6: Heteroscedasticity test

Heteroskedasticity Test: ARCH

F-statistic	0.272112	Prob. F(1,24)	0.6067
Obs*R-squared	0.291484	Prob. Chi-Square(1)	0.5893

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/17/23 Time: 15:55
Sample (adjusted): 1994 2019
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.003722	0.001303	2.855815	0.0087
RESID^2(-1)	0.104807	0.200917	0.521644	0.6067

R-squared	0.011211	Mean dependent var	0.004137
Adjusted R-squared	-0.029989	S.D. dependent var	0.005188
S.E. of regression	0.005265	Akaike info criterion	-7.581589
Sum squared resid	0.000665	Schwarz criterion	-7.484812
Log likelihood	100.5607	Hannan-Quinn criter.	-7.553721
F-statistic	0.272112	Durbin-Watson stat	1.990234
Prob(F-statistic)	0.606699		

Appendix 7: Misspecification: Ramsey Reset Test

Ramsey RESET Test
Equation: UNTITLED
Omitted Variables: Squares of fitted values
Specification: POV POV(-1) CREDIT GINI GINI(-1) GINI(-2) UNEMP UNEMP(-1) UNEMP(-2) C

	Value	df	Probability
t-statistic	0.955463	17	0.3527
F-statistic	0.912909	(1, 17)	0.3527
Likelihood ratio	1.412324	1	0.2347

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	0.005494	1	0.005494
Restricted SSR	0.107808	18	0.005989
Unrestricted SSR	0.102314	17	0.006018

LR test summary:

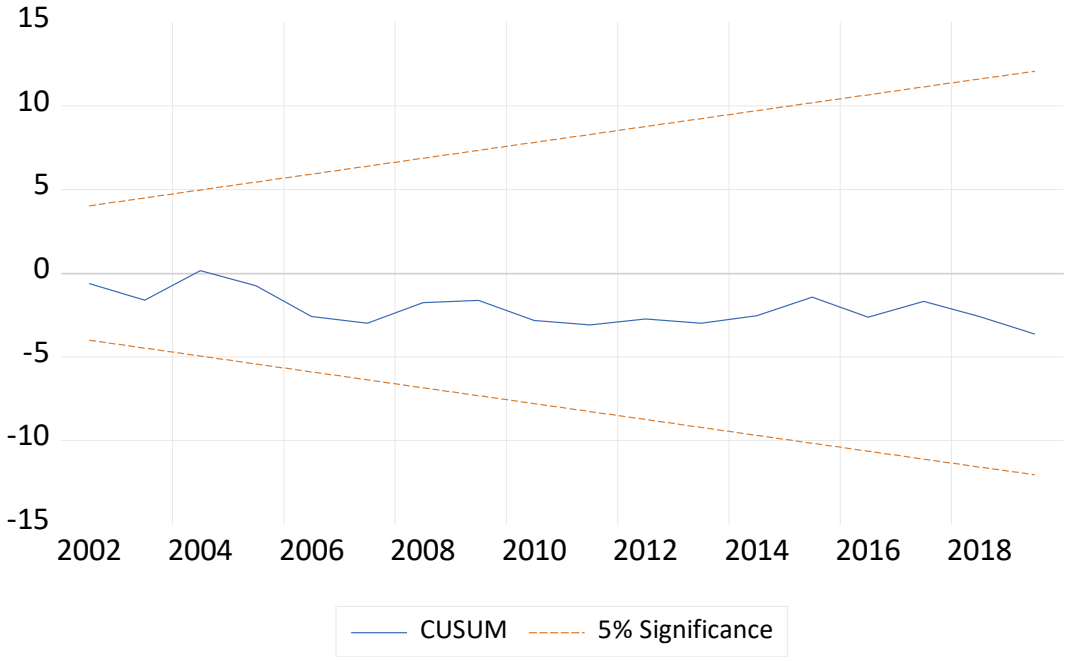
	Value
Restricted LogL	36.25237
Unrestricted LogL	36.95853

Unrestricted Test Equation:
Dependent Variable: POV
Method: Least Squares
Date: 04/17/23 Time: 15:55
Sample: 1993 2019
Included observations: 27

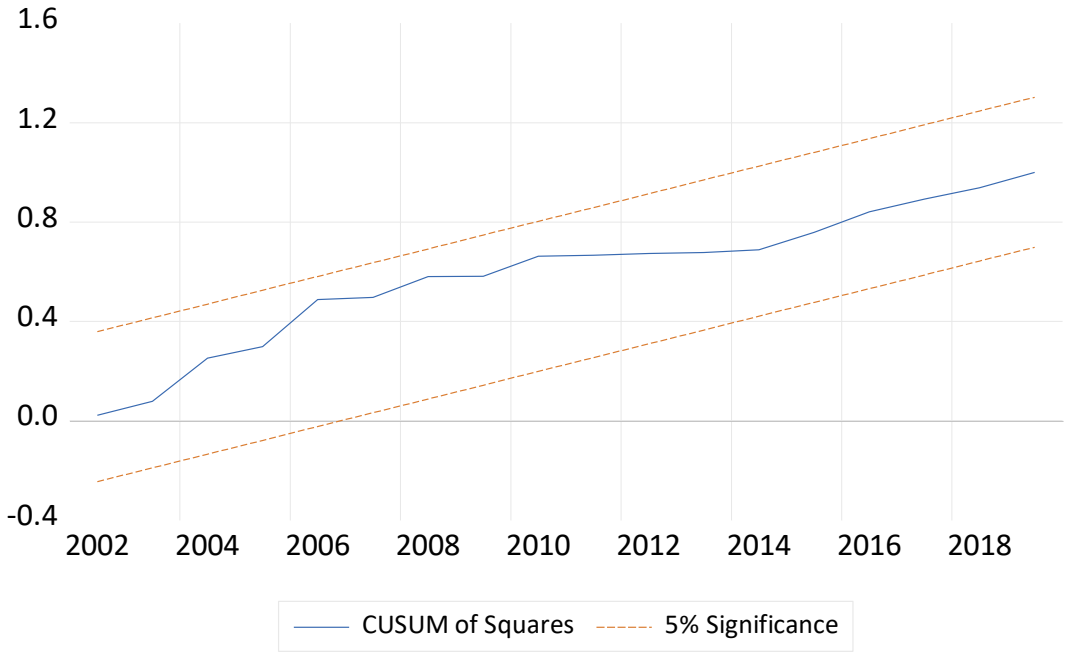
Variable	Coefficient	Std. Error	t-Statistic	Prob.
POV(-1)	0.055173	0.159321	0.346304	0.7334
CREDIT	0.656064	0.395438	1.659080	0.1154
GINI	5.964001	1.914021	3.115954	0.0063
GINI(-1)	1.688083	1.636578	1.031471	0.3168
GINI(-2)	1.548557	1.616067	0.958226	0.3514
UNEMP	-0.126651	0.153603	-0.824537	0.4211
UNEMP(-1)	0.508686	0.261772	1.943239	0.0687
UNEMP(-2)	-0.182948	0.173652	-1.053535	0.3068
C	-37.89535	11.59915	-3.267079	0.0045
FITTED^2	-0.413917	0.433211	-0.955463	0.3527

R-squared	0.945368	Mean dependent var	-0.144044
Adjusted R-squared	0.916445	S.D. dependent var	0.268384
S.E. of regression	0.077579	Akaike info criterion	-1.996928
Sum squared resid	0.102314	Schwarz criterion	-1.516988
Log likelihood	36.95853	Hannan-Quinn criter.	-1.854217
F-statistic	32.68586	Durbin-Watson stat	2.398229
Prob(F-statistic)	0.000000		

Appendix 8: Recursive Estimation: CUSUM Test



Appendix 9: Recursive Estimation: CUSUM of Square Test



Appendix 10: Causality Test

Pairwise Granger Causality Tests
Date: 04/17/23 Time: 16:02
Sample: 1991 2019
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CREDIT does not Granger Cause POV	27	0.74660	0.4856
POV does not Granger Cause CREDIT		0.28677	0.7534
GINI does not Granger Cause POV	27	0.90743	0.4181
POV does not Granger Cause GINI		5.29473	0.0133
UNEMP does not Granger Cause POV	27	0.43456	0.6530
POV does not Granger Cause UNEMP		0.26546	0.7693
GINI does not Granger Cause CREDIT	27	2.43086	0.1112
CREDIT does not Granger Cause GINI		2.80946	0.0819
UNEMP does not Granger Cause CREDIT	27	0.90790	0.4180
CREDIT does not Granger Cause UNEMP		3.41180	0.0512
UNEMP does not Granger Cause GINI	27	0.98981	0.3876
GINI does not Granger Cause UNEMP		0.16021	0.8530

Appendix 11: Unit Root Test (Augmented Dickey-Fuller)

Appendix 11.1: Variable: POV (Level)

Null Hypothesis: POV has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.986452	0.5832
Test critical values:	1% level	-4.323979	
	5% level	-3.580622	
	10% level	-3.225334	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(POV)
Method: Least Squares
Date: 04/17/23 Time: 16:03
Sample (adjusted): 1992 2019
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
POV(-1)	-0.332392	0.167330	-1.986452	0.0580
C	-0.159559	0.119080	-1.339925	0.1923
@TREND("1991")	0.008409	0.006060	1.387637	0.1775

R-squared	0.165379	Mean dependent var	0.025112
Adjusted R-squared	0.098609	S.D. dependent var	0.113657
S.E. of regression	0.107908	Akaike info criterion	-1.514118
Sum squared resid	0.291103	Schwarz criterion	-1.371382
Log likelihood	24.19765	Hannan-Quinn criter.	-1.470482
F-statistic	2.476858	Durbin-Watson stat	2.085316
Prob(F-statistic)	0.104380		

Appendix 11.2 : Variable: POV (First difference)

Null Hypothesis: D(POV) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.274250	0.0000
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(POV,2)
Method: Least Squares
Date: 04/17/23 Time: 16:03
Sample (adjusted): 1993 2019
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(POV(-1))	-1.223195	0.194955	-6.274250	0.0000
C	0.031855	0.022712	1.402565	0.1730

R-squared	0.611597	Mean dependent var	-2.06E-18
Adjusted R-squared	0.596061	S.D. dependent var	0.180987
S.E. of regression	0.115028	Akaike info criterion	-1.416087
Sum squared resid	0.330789	Schwarz criterion	-1.320099
Log likelihood	21.11717	Hannan-Quinn criter.	-1.387545
F-statistic	39.36621	Durbin-Watson stat	2.043642
Prob(F-statistic)	0.000001		

Appendix 11.3: Variable (CREDIT)- Level

Null Hypothesis: CREDIT has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.407075	0.8365
Test critical values:	1% level	-4.323979	
	5% level	-3.580622	
	10% level	-3.225334	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CREDIT)
Method: Least Squares
Date: 04/17/23 Time: 16:04
Sample (adjusted): 1992 2019
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CREDIT(-1)	-0.136002	0.096656	-1.407075	0.1717
C	0.700209	0.470514	1.488180	0.1492
@TREND("1991")	0.000778	0.001977	0.393315	0.6974

R-squared	0.129949	Mean dependent var	0.016920
Adjusted R-squared	0.060345	S.D. dependent var	0.049987
S.E. of regression	0.048455	Akaike info criterion	-3.115392
Sum squared resid	0.058698	Schwarz criterion	-2.972656
Log likelihood	46.61549	Hannan-Quinn criter.	-3.071756
F-statistic	1.866973	Durbin-Watson stat	2.176860
Prob(F-statistic)	0.175513		

Appendix 11.4: Variable (Credit)-First difference

Null Hypothesis: D(CREDIT) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.488693	0.0001
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CREDIT,2)
Method: Least Squares
Date: 04/17/23 Time: 16:05
Sample (adjusted): 1993 2019
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CREDIT(-1))	-1.101544	0.200693	-5.488693	0.0000
C	0.019401	0.010370	1.870851	0.0731

R-squared	0.546491	Mean dependent var	0.002449
Adjusted R-squared	0.528351	S.D. dependent var	0.074901
S.E. of regression	0.051439	Akaike info criterion	-3.025640
Sum squared resid	0.066150	Schwarz criterion	-2.929652
Log likelihood	42.84614	Hannan-Quinn criter.	-2.997098
F-statistic	30.12575	Durbin-Watson stat	1.945364
Prob(F-statistic)	0.000011		

Appendix 11.5: Variable(UNEMP)- level

Null Hypothesis: UNEMP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 1 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.971753	0.1578
Test critical values:	1% level	-4.339330	
	5% level	-3.587527	
	10% level	-3.229230	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UNEMP)
Method: Least Squares
Date: 04/17/23 Time: 16:05
Sample (adjusted): 1993 2019
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UNEMP(-1)	-0.258851	0.087104	-2.971753	0.0068
D(UNEMP(-1))	0.707402	0.156784	4.511968	0.0002
C	0.432153	0.156195	2.766753	0.0110
@TREND("1991")	0.000462	0.002649	0.174285	0.8632

R-squared	0.497244	Mean dependent var	-0.026471
Adjusted R-squared	0.431667	S.D. dependent var	0.140972
S.E. of regression	0.106276	Akaike info criterion	-1.509605
Sum squared resid	0.259774	Schwarz criterion	-1.317629
Log likelihood	24.37967	Hannan-Quinn criter.	-1.452521
F-statistic	7.582610	Durbin-Watson stat	1.695765
Prob(F-statistic)	0.001064		

Appendix 11.6: Variable (UNEMP)-First difference

Null Hypothesis: D(UNEMP) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.441782	0.0185
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(UNEMP,2)
Method: Least Squares
Date: 04/17/23 Time: 16:06
Sample (adjusted): 1994 2019
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(UNEMP(-1))	-0.605040	0.175793	-3.441782	0.0022
D(UNEMP(-1),2)	0.399922	0.184844	2.163568	0.0411
C	-0.011126	0.022210	-0.500953	0.6212

R-squared	0.347168	Mean dependent var	0.000869
Adjusted R-squared	0.290400	S.D. dependent var	0.132300
S.E. of regression	0.111446	Akaike info criterion	-1.442383
Sum squared resid	0.285666	Schwarz criterion	-1.297218
Log likelihood	21.75097	Hannan-Quinn criter.	-1.400580
F-statistic	6.115559	Durbin-Watson stat	2.024852
Prob(F-statistic)	0.007417		

Appendix 11.7: Variable (GINI)-Level

Null Hypothesis: GINI has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.750817	0.0037
Test critical values:	1% level	-4.323979	
	5% level	-3.580622	
	10% level	-3.225334	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GINI)
Method: Least Squares
Date: 04/17/23 Time: 16:06
Sample (adjusted): 1992 2019
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GINI(-1)	-0.706953	0.148807	-4.750817	0.0001
C	2.604894	0.546705	4.764717	0.0001
@TREND("1991")	0.000984	0.000361	2.722155	0.0116

R-squared	0.492868	Mean dependent var	0.003147
Adjusted R-squared	0.452297	S.D. dependent var	0.013701
S.E. of regression	0.010140	Akaike info criterion	-6.243713
Sum squared resid	0.002570	Schwarz criterion	-6.100977
Log likelihood	90.41198	Hannan-Quinn criter.	-6.200077
F-statistic	12.14841	Durbin-Watson stat	2.375277
Prob(F-statistic)	0.000206		

Appendix 11.8: Variable (GINI)-First difference

Null Hypothesis: D(GINI) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.242438	0.0000
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(GINI,2)
Method: Least Squares
Date: 04/17/23 Time: 16:07
Sample (adjusted): 1993 2019
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GINI(-1))	-1.212901	0.194299	-6.242438	0.0000
C	0.003551	0.002733	1.299585	0.2056

R-squared	0.609180	Mean dependent var	-0.000298
Adjusted R-squared	0.593547	S.D. dependent var	0.021696
S.E. of regression	0.013832	Akaike info criterion	-5.652445
Sum squared resid	0.004783	Schwarz criterion	-5.556457
Log likelihood	78.30801	Hannan-Quinn criter.	-5.623903
F-statistic	38.96803	Durbin-Watson stat	1.736669
Prob(F-statistic)	0.000002		

Appendix 12: Phillip Perons

Appendix 12.1: Variable(POV)- Level

Null Hypothesis: POV has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.986452	0.5832
Test critical values:	1% level	-4.323979	
	5% level	-3.580622	
	10% level	-3.225334	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.010397
HAC corrected variance (Bartlett kernel)	0.010397

Phillips-Perron Test Equation
Dependent Variable: D(POV)
Method: Least Squares
Date: 04/17/23 Time: 16:11
Sample (adjusted): 1992 2019
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
POV(-1)	-0.332392	0.167330	-1.986452	0.0580
C	-0.159559	0.119080	-1.339925	0.1923
@TREND("1991")	0.008409	0.006060	1.387637	0.1775

R-squared	0.165379	Mean dependent var	0.025112
Adjusted R-squared	0.098609	S.D. dependent var	0.113657
S.E. of regression	0.107908	Akaike info criterion	-1.514118
Sum squared resid	0.291103	Schwarz criterion	-1.371382
Log likelihood	24.19765	Hannan-Quinn criter.	-1.470482
F-statistic	2.476858	Durbin-Watson stat	2.085316
Prob(F-statistic)	0.104380		

Appendix 12.2: Variable(POV)- First Difference

Null Hypothesis: D(POV) has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.428268	0.0000
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.012251
HAC corrected variance (Bartlett kernel)	0.010014

Phillips-Perron Test Equation
Dependent Variable: D(POV,2)
Method: Least Squares
Date: 04/17/23 Time: 16:11
Sample (adjusted): 1993 2019
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(POV(-1))	-1.223195	0.194955	-6.274250	0.0000
C	0.031855	0.022712	1.402565	0.1730

R-squared	0.611597	Mean dependent var	-2.06E-18
Adjusted R-squared	0.596061	S.D. dependent var	0.180987
S.E. of regression	0.115028	Akaike info criterion	-1.416087
Sum squared resid	0.330789	Schwarz criterion	-1.320099
Log likelihood	21.11717	Hannan-Quinn criter.	-1.387545
F-statistic	39.36621	Durbin-Watson stat	2.043642
Prob(F-statistic)	0.000001		

Appendix 12.3: Variable (CREDIT)- Level

Null Hypothesis: CREDIT has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.328222	0.8595
Test critical values:	1% level	-4.323979	
	5% level	-3.580622	
	10% level	-3.225334	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.002096
HAC corrected variance (Bartlett kernel)	0.001817

Phillips-Perron Test Equation
Dependent Variable: D(CREDIT)
Method: Least Squares
Date: 04/17/23 Time: 16:11
Sample (adjusted): 1992 2019
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CREDIT(-1)	-0.136002	0.096656	-1.407075	0.1717
C	0.700209	0.470514	1.488180	0.1492
@TREND("1991")	0.000778	0.001977	0.393315	0.6974

R-squared	0.129949	Mean dependent var	0.016920
Adjusted R-squared	0.060345	S.D. dependent var	0.049987
S.E. of regression	0.048455	Akaike info criterion	-3.115392
Sum squared resid	0.058698	Schwarz criterion	-2.972656
Log likelihood	46.61549	Hannan-Quinn criter.	-3.071756
F-statistic	1.866973	Durbin-Watson stat	2.176860
Prob(F-statistic)	0.175513		

Appendix 12.4: Variable (CREDIT)- First Difference

Null Hypothesis: D(CREDIT) has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-5.482634	0.0001
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.002450
HAC corrected variance (Bartlett kernel)	0.002803

Phillips-Perron Test Equation
Dependent Variable: D(CREDIT,2)
Method: Least Squares
Date: 04/17/23 Time: 16:12
Sample (adjusted): 1993 2019
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CREDIT(-1))	-1.101544	0.200693	-5.488693	0.0000
C	0.019401	0.010370	1.870851	0.0731

R-squared	0.546491	Mean dependent var	0.002449
Adjusted R-squared	0.528351	S.D. dependent var	0.074901
S.E. of regression	0.051439	Akaike info criterion	-3.025640
Sum squared resid	0.066150	Schwarz criterion	-2.929652
Log likelihood	42.84614	Hannan-Quinn criter.	-2.997098
F-statistic	30.12575	Durbin-Watson stat	1.945364
Prob(F-statistic)	0.000011		

Appendix 12.5: Variable (UNEMP)- Level

Null Hypothesis: UNEMP has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.444511	0.8245
Test critical values:	1% level	-4.323979	
	5% level	-3.580622	
	10% level	-3.225334	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.018010
HAC corrected variance (Bartlett kernel)	0.028167

Phillips-Perron Test Equation
Dependent Variable: D(UNEMP)
Method: Least Squares
Date: 04/17/23 Time: 16:12
Sample (adjusted): 1992 2019
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
UNEMP(-1)	-0.108077	0.107964	-1.001051	0.3264
C	0.195906	0.196965	0.994624	0.3294
@TREND("1991")	-0.001997	0.003323	-0.601070	0.5532

R-squared	0.051436	Mean dependent var	-0.022026
Adjusted R-squared	-0.024449	S.D. dependent var	0.140322
S.E. of regression	0.142027	Akaike info criterion	-0.964645
Sum squared resid	0.504290	Schwarz criterion	-0.821909
Log likelihood	16.50503	Hannan-Quinn criter.	-0.921009
F-statistic	0.677821	Durbin-Watson stat	0.841901
Prob(F-statistic)	0.516809		

Appendix 12.6: Variable (UNEMP)- First difference

Null Hypothesis: D(UNEMP) has a unit root
Exogenous: Constant
Bandwidth: 1 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.951265	0.0527
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.013317
HAC corrected variance (Bartlett kernel)	0.016633

Phillips-Perron Test Equation
Dependent Variable: D(UNEMP,2)
Method: Least Squares
Date: 04/17/23 Time: 16:13
Sample (adjusted): 1993 2019
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(UNEMP(-1))	-0.455532	0.164720	-2.765490	0.0105
C	-0.015260	0.023328	-0.654149	0.5190

R-squared	0.234255	Mean dependent var	-0.005880
Adjusted R-squared	0.203625	S.D. dependent var	0.134387
S.E. of regression	0.119927	Akaike info criterion	-1.332681
Sum squared resid	0.359562	Schwarz criterion	-1.236693
Log likelihood	19.99120	Hannan-Quinn criter.	-1.304139
F-statistic	7.647936	Durbin-Watson stat	1.460325
Prob(F-statistic)	0.010527		

Appendix 12.7: Variable (GINI)- Level

Null Hypothesis: GINI has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 0 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.750817	0.0037
Test critical values:	1% level	-4.323979	
	5% level	-3.580622	
	10% level	-3.225334	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	9.18E-05
HAC corrected variance (Bartlett kernel)	9.18E-05

Phillips-Perron Test Equation
Dependent Variable: D(GINI)
Method: Least Squares
Date: 04/17/23 Time: 16:13
Sample (adjusted): 1992 2019
Included observations: 28 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GINI(-1)	-0.706953	0.148807	-4.750817	0.0001
C	2.604894	0.546705	4.764717	0.0001
@TREND("1991")	0.000984	0.000361	2.722155	0.0116

R-squared	0.492868	Mean dependent var	0.003147
Adjusted R-squared	0.452297	S.D. dependent var	0.013701
S.E. of regression	0.010140	Akaike info criterion	-6.243713
Sum squared resid	0.002570	Schwarz criterion	-6.100977
Log likelihood	90.41198	Hannan-Quinn criter.	-6.200077
F-statistic	12.14841	Durbin-Watson stat	2.375277
Prob(F-statistic)	0.000206		

Appendix 12.8: Variable (GINI)- First difference

Null Hypothesis: D(GINI) has a unit root
Exogenous: Constant
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-6.765423	0.0000
Test critical values:	1% level	-3.699871	
	5% level	-2.976263	
	10% level	-2.627420	

*MacKinnon (1996) one-sided p-values.

Residual variance (no correction)	0.000177
HAC corrected variance (Bartlett kernel)	0.000106

Phillips-Perron Test Equation
Dependent Variable: D(GINI,2)
Method: Least Squares
Date: 04/17/23 Time: 16:14
Sample (adjusted): 1993 2019
Included observations: 27 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(GINI(-1))	-1.212901	0.194299	-6.242438	0.0000
C	0.003551	0.002733	1.299585	0.2056

R-squared	0.609180	Mean dependent var	-0.000298
Adjusted R-squared	0.593547	S.D. dependent var	0.021696
S.E. of regression	0.013832	Akaike info criterion	-5.652445
Sum squared resid	0.004783	Schwarz criterion	-5.556457
Log likelihood	78.30801	Hannan-Quinn criter.	-5.623903
F-statistic	38.96803	Durbin-Watson stat	1.736669
Prob(F-statistic)	0.000002		

Appendix 13: Ng Perron

Appendix 13.1: Variable (POV)- Level

Null Hypothesis: POV has a unit root
Exogenous: Constant, Linear Trend
Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=6)
Sample: 1991 2019
Included observations: 29

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-7.86151	-1.81689	0.23111	11.9771
Asymptotic critical values*:	1%	-23.8000	-3.42000	0.14300	4.03000
	5%	-17.3000	-2.91000	0.16800	5.48000
	10%	-14.2000	-2.62000	0.18500	6.67000

*Ng-Perron (2001, Table 1)

HAC corrected variance (Spectral GLS-detrended AR)	0.010581

Appendix 13.2: Variable (POV)- First difference

Null Hypothesis: D(POV) has a unit root
Exogenous: Constant
Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=6)
Sample (adjusted): 1992 2019
Included observations: 28 after adjustments

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-12.8694	-2.53566	0.19703	1.90761
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

*Ng-Perron (2001, Table 1)

HAC corrected variance (Spectral GLS-detrended AR)	0.012391

Appendix 13.3: Variable (CREDIT)- Level

Null Hypothesis: CREDIT has a unit root
Exogenous: Constant, Linear Trend
Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=6)
Sample: 1991 2019
Included observations: 29

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-3.05576	-1.16569	0.38147	28.0703
Asymptotic critical values*:	1%	-23.8000	-3.42000	0.14300	4.03000
	5%	-17.3000	-2.91000	0.16800	5.48000
	10%	-14.2000	-2.62000	0.18500	6.67000

*Ng-Perron (2001, Table 1)

HAC corrected variance (Spectral GLS-detrended AR)	0.002250

Appendix 13.4: Variable (CREDIT)- First difference

Null Hypothesis: D(CREDIT) has a unit root
Exogenous: Constant
Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=6)
Sample (adjusted): 1992 2019
Included observations: 28 after adjustments

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-13.2868	-2.53752	0.19098	1.99488
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

*Ng-Perron (2001, Table 1)

HAC corrected variance (Spectral GLS-detrended AR)	0.002477

Appendix 13.5: Variable (UNEMP)- Level

Null Hypothesis: UNEMP has a unit root
Exogenous: Constant, Linear Trend
Lag length: 1 (Spectral GLS-detrended AR based on SIC, maxlag=6)
Sample: 1991 2019
Included observations: 29

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-20.6344	-3.15326	0.15282	4.76375
Asymptotic critical values*:	1%	-23.8000	-3.42000	0.14300	4.03000
	5%	-17.3000	-2.91000	0.16800	5.48000
	10%	-14.2000	-2.62000	0.18500	6.67000

*Ng-Perron (2001, Table 1)

HAC corrected variance (Spectral GLS-detrended AR)	0.100570

Appendix 13.6: Variable (UNEMP)- First difference

Null Hypothesis: D(UNEMP) has a unit root
Exogenous: Constant
Lag length: 1 (Spectral GLS-detrended AR based on SIC, maxlag=6)
Sample (adjusted): 1992 2019
Included observations: 28 after adjustments

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-19.9194	-3.14659	0.15797	1.26247
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

*Ng-Perron (2001, Table 1)

HAC corrected variance (Spectral GLS-detrended AR)	0.030418

Appendix 13.7: Variable (Gini)- Level

Null Hypothesis: GINI has a unit root
Exogenous: Constant, Linear Trend
Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=6)
Sample: 1991 2019
Included observations: 29

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-9.05791	-2.11991	0.23404	10.0907
Asymptotic critical values*:	1%	-23.8000	-3.42000	0.14300	4.03000
	5%	-17.3000	-2.91000	0.16800	5.48000
	10%	-14.2000	-2.62000	0.18500	6.67000

*Ng-Perron (2001, Table 1)

HAC corrected variance (Spectral GLS-detrended AR)	0.000123

Appendix 13.8: Variable (Gini)- First difference

Null Hypothesis: D(GINI) has a unit root
Exogenous: Constant
Lag length: 0 (Spectral GLS-detrended AR based on SIC, maxlag=6)
Sample (adjusted): 1992 2019
Included observations: 28 after adjustments

		MZa	MZt	MSB	MPT
Ng-Perron test statistics		-12.9619	-2.54387	0.19626	1.89742
Asymptotic critical values*:	1%	-13.8000	-2.58000	0.17400	1.78000
	5%	-8.10000	-1.98000	0.23300	3.17000
	10%	-5.70000	-1.62000	0.27500	4.45000

*Ng-Perron (2001, Table 1)

HAC corrected variance (Spectral GLS-detrended AR)	0.000184