The Implications of Economic Growth and Income Inequality on Poverty: An Analytical Study of the Libyan Economy

تداعيات النمو الاقتصادي وعدم المساواة في توزيع الدخل على الفقر: دراسة تحليلية للاقتصاد الليبي

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Abstract:

This research examines whether the economic growth and income inequality cause or reduce poverty in Libya from 2000 to 2023. With the help of the Vector Autoregressive (VAR) Model, the research estimates this dynamic relationship. The Theil Index measures income inequality, while individual consumption rates are used to reflect poverty levels. Economic growth is indicated by per capita real GDP. Both previous year poverty (POV_{-1}) and previous year income inequality (INQ_{-1}) have a positive impact on this year poverty (POV) according to the results. Interestingly, the elasticity of income inequality in affecting future poverty is quite high. A drop in income (or per capita GDP(GRW_{-1}) in the previous year is correlated with an increase in poverty (POV). However, the inflation (INF_{-1}) and political and security stability (Ps_{-1}) statistically have no impact on poverty in Libya.

***Keywords**: Poverty, Income Inequality, Economic Growth, Libyan Economy, Theil Index.*

الملخص:

هدفت الدراسة إلى تبيان العلاقة البينية في إطار مثلث النمو الاقتصادي ولامساواة الدخول والفقر في ليبيا خلال الفترة 2000-2023م، وتم استخدام أسلوب "V. Autoregressive Model" لتقدير العلاقة بين متغيرات دوال الدراسة، واستخدم معامل "Theil Index" كمؤشر لعدم مساواة الدخول بالاقتصاد الليبي ومعدل الاستهلاك الفردي كممثل لمعدل الفقر، وعكس نصيب الفرد من الناتج المحلي الإجمالي معدل النمو الاقتصادي. أظهرت النتائج أن مستويات الفقر (POV_{-1}) وتفاوت الدخول (INQ_{-1}) للسنة السابقة يرتبطان بعلاقة طردية مع مستويات الفقر للسنة اللاحقة (POV)، ويتمتع متغير تفاوت الدخول بمرونة عالية مع متغير الفقر للسنة اللاحقة. أما متغير انخفاض نصيب الفرد من الناتج المحلي للسنة السابقة (GRW_{-1}) يؤدي لزيادة مستوى الفقر للسنة اللاحقة. في حين أظهرت النتائج عدم وجود آثار على مستويات الفقر في الاقتصاد الليبي لكل من متغيري معدل التضخم (INF_{-1})، ومستوى الاستقرار السياسي والأمني للدولة (Ps_{-1}).

***الكلمات الدالة:** الفقر، لامساواة الدخول، النمو الاقتصادي، الاقتصاد الليبي، مؤشر ثايل "Theil Index".*

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1. INTRODUCTION

Studies on income distribution are a crucial part of the development sciences because they shed light on the impact of economic policies on social welfare. An equitable income distribution is the most important criterion for social justice in any society. The focus on economic development is often on growth in gross domestic product (GDP). However, it is equally (or even more) important to examine income distributions. An increase in national income does not mean that the standard of living of most people will rise. In fact, without a fair distribution of the benefits from growth, there could be widespread perceptions of unfairness and dissatisfaction with the government.

New research from poor countries shows that as economies grow, incomes do not necessarily get any better distributed. On the contrary, it can enlarge the disparity between the social groups. The difference often makes the poorest people worse off, both in terms of their relative economic position and in terms of their total earnings. For example, Abdala and Kabdani (2013[a]) show that in some countries that is developing, economic growth does not improve income distribution but it worsens social and economic inequalities, which aggravates the poverty rate.

The unequal distribution of income can lead to poverty, which is an important issue policy maker must deal with, especially in the developing world, Libya. Due to the complexities of Libya's economy there need to be effective measures to reform income distribution in Libya. The problem is important because the country is currently facing economic issues. Various economic reforms have been carried out but social justice and fair income distribution is a dream.

Poverty is linked two things, Economic Growth and Income distribution. When economic growth and income distribution happen together, poverty can be reduced significantly. Unequal income distribution can deepen poverty and social instability and make the situation worse. So, the link between economic growth and income inequality in Libya is important in searching for realistic solutions for Libya's development problems.

1.2. Research Question

What is the relationship between economic growth and income inequality in the Libyan economy, and how have these factors influenced poverty levels during the period from 2000 to 2023?

1.3. Study Hypothesis:

There is a statistically significant relationship between economic growth and income inequality on one hand, and poverty levels in the Libyan economy on the other. Disparities in income distribution contribute to increased poverty, whereas economic growth, when achieved in a comprehensive and equitable manner, can lead to poverty reduction and stability.

1.4. Study aims

This study aims to thoroughly analyze the implications of the relationship between economic growth and income inequality on poverty levels in the Libyan economy.

1.5. Study sample

Its focused in Libya economy during 2000 to 2023. A major focus of the study is to explore how unequal income distribution worsens or alleviates poverty levels. Given the importance of this issue for Libyan economic policy, the study aims to provide solid scientific evidence that can help shape

effective development strategies. These strategies are designed to improve the overall welfare and socioeconomic conditions of Libyan society, contributing to sustainable and inclusive economic progress.

1.3. Study approach

its represented in advanced statistical methods, such as unit root tests and vector autoregression (VAR) analysis, the research will carefully examine the dynamic connections between key economic variables in Libya.

2. Literature Review

Understanding the implications of the relationship between economic growth and income inequality on poverty levels presents a major challenge in contemporary economies. This issue is more complex than it may initially appear, as confirmed by numerous empirical studies conducted in various contexts. For example, a study of the Japanese economy between 1996 and 2002 revealed that Japan's poverty rate is among the highest in developed countries, ranking third in terms of poverty rate. The study found that the poverty rate was 15.3%, raising questions about who the poor are in Japan and the severity of their social and economic conditions (Tachibanaki, 2006). Similarly, a study covering nine Western European countries between 1980 and 1995 found that poverty became a particular threat to young people, with poverty rates rising among the 18 to 30 age group in all the countries studied. In contrast, older age groups, particularly those aged 65 and above, showed evidence of a decline in poverty rates (Veli-Matti, 2001).

On the other hand, some studies suggest that the effect of economic growth on income inequality may not be as severe as previously believed. For example, a study examining 146 developing and developed countries between 1950 and 1986 showed that income inequality had gradually declined over time. A decrease in income inequality levels was also observed alongside income growth, reflecting a gradual improvement in wealth distribution over the long term (Heshmati, 2004). Furthermore, several studies have shown that the relationship between economic growth, income inequality, and poverty is complex and intertwined. For instance, a study of 96 developing countries from 1970 to 2013 demonstrated a strong, interrelated relationship between the poverty rate (measured by per capita consumption), the Gini coefficient (which measures inequality in income distribution), and the economic growth rate (measured by per capita GDP) (Ayad, 2016[a]). Similarly, a study of the Pakistani economy from 1972 to 2008 revealed that poverty rates were significantly influenced by income inequality, especially when measured using the Gini coefficient (Ali, 2010). Moreover, a study of 22 Latin American countries from 1960 to 2007 confirmed a robust and influential relationship between poverty rates and income inequality, highlighting the significant impact of inequality on poverty levels in those countries (Biggs et al., 2010).

While some studies have shown clear and direct results regarding the relationship between economic growth, income inequality, and their implications for poverty, it has been emphasized that this relationship is often positive. For example, a study conducted on the Algerian economy between 1970 and 2013 found a positive relationship between the poverty rate and the Theil Index of inequality, both in the short and long term (Ayad, & Ben Lasheb, 2016; Ayad, 2016[a]). Additionally, the study aligned with one conducted on developing countries from 1973 to 1988, where the results indicated that economic growth does not reduce poverty and that economic growth is not correlated

with income inequality (Fields, 1989). On the other hand, a study covering 123 countries between 1977 and 2007 showed that increasing income inequality directly leads to higher poverty levels, particularly after reaching a certain level of economic growth (Fosu, 2017[d]). A study examining the Pakistani economy between 1963 and 1995 also indicated that reducing income inequality accelerates the process of poverty reduction once a certain threshold of economic growth is achieved. However, it was found that mismanagement of growth can worsen income inequality at the national level, with a more significant impact in rural areas than in urban areas. This increasing inequality, coupled with minimal changes in overall economic growth, has contributed to a greater rise in poverty levels in urban areas compared to rural areas (Syed & Tahir, 1999).

Conversely, a study covering several countries from 1980 to 2004 indicated that poverty levels are directly affected, albeit to a small extent, by income inequality (Fosu, 2010[b]). A study conducted on a number of developing countries between 1980 and 2010 did not yield the same result, as the findings showed that the 1980s and 1990s witnessed a significant increase in poverty due to worsening income inequality. However, a slight decrease in inequality was observed during the first decade of the 21st century (Leonardo, 2013). In Latin America, a study confirmed that income inequality reached its highest levels in the past four decades, while absolute poverty rates have been rising since 1980. The study concluded that economic growth is a primary factor in reducing extreme poverty in these countries (Escosura, 2005).

Another study, which included 119 developing countries between 1970 and 2008, showed a positive relationship between income inequality and per capita GDP, reflecting the direct effect of increasing inequality on individual income levels (Imai & Gaiha, 2014).

In another context, some researchers argue that the relationship between economic growth and income inequality has an inverse effect on poverty, with many studies indicating that increasing economic growth does not necessarily lead to poverty reduction if it is accompanied by worsening inequality. For example, a study that covered 89 countries between 1990 and 2011 demonstrated that income inequality and economic growth have an inverse effect on poverty rates, meaning that decreasing inequality can lead to more effective poverty reduction (Dhrifi, 2013). This view is supported by a study examining the Chinese economy between 1980 and 2000, which concluded that increasing inequality leads to a reduction in poverty rates, thus reflecting an inverse relationship between them (Yao et al., 2004). Similarly, a study conducted on the Pakistani economy between 1979 and 2002 showed that there is a high elasticity of poverty levels in response to changes in inequality, highlighting the importance of reducing income inequality in poverty reduction efforts. The study concluded that reducing inequality contributes to accelerating poverty reduction once a certain level of economic growth is achieved (Jamal, 2006).

Furthermore, a study involving several African countries reported that poverty is inversely related to both economic growth and income inequality, suggesting that growth does not necessarily reduce poverty unless income distribution is fair (Fosu, 2010[b]). Another study covering most countries worldwide between 1980 and 2004 found that poverty is inversely affected by economic growth, but only slightly, due to inequality in income distribution (Fosu, 2010[c]). A study conducted on the Algerian economy also highlighted an inverse relationship between the poverty rate and economic growth in both the short and long terms, emphasizing the crucial role that economic growth can play

in reducing poverty in Algeria (Ayad, & Ben Lasheb, 2016; Ayad, 2016[a]). Similarly, a study covering several Arab economies (Jordan, Tunisia, Algeria, Egypt, Morocco, Mauritania, and Yemen) between 1986 and 2012 found that high growth rates do not necessarily improve the situation of the poor, especially if this growth is accompanied by an unequal distribution of wealth favoring the wealthiest groups, which hinders poverty reduction (Abdul Karim Wahiba, 2013).

Finally, a study of developing countries between 1970 and 2013 identified a bidirectional causal relationship between poverty rates and economic growth, indicating that the poor in these countries can benefit from economic growth if it is accompanied by policies aimed at reducing inequality and ensuring more equitable wealth distribution (Ayad & Belmokdad, 2016). Despite the conflicting results from various studies on the relationship between economic growth, income inequality, and poverty, some research points to the potential solutions lying in enhancing economic growth. A study involving 50 developing and developed countries between 1980 and 1999 found that economic growth is an effective means of reducing poverty. The study showed a strong statistical relationship between growth and poverty reduction, suggesting that economic growth contributes to poverty alleviation due to its limited impact on regional inequality (Adams, 2003). Similarly, another study involving 60 developing countries found that economic growth contributes to poverty reduction in these countries (Adams, 2004). The results of a study on the Algerian economy between 1980 and 2013 confirmed that economic growth helped reduce income inequality between 1989 and 1999 (Seraj & Nawais, 2017).

Furthermore, a study covering 52 developing and developed countries between 1960 and 2000 found that financial development reduces income inequality by increasing the income of the poor. The results suggest that countries with more developed financial systems experience faster declines in both poverty and income inequality (Beck et al., 2004). In contrast, a study of 12 Latin American countries between 1970 and 1994 showed that while economic growth reduces the income of residents in poor cities and villages, it does not directly affect income inequality (Janvry & Sadoulet, 2000). A study of the Chinese economy also indicated that income growth in poor cities is more strongly influenced when levels of inequality and poverty are low (Yao et al., 2004).

Some studies suggest that the key to addressing these issues lies in the proper application of state fiscal policies. A study examining Argentina, Bolivia, Brazil, Mexico, Peru, and Uruguay found that fiscal policy tools, such as direct taxes and cash transfers, help reduce inequality and poverty in Argentina, Brazil, and Uruguay. However, their impact is weaker in Bolivia, Mexico, and Peru. The study also found that the potential to reduce income inequality and poverty through direct progressive taxes is limited and ineffective, while in-kind transfers, such as investments in education and health, contribute more to reducing inequality across all countries studied than cash transfers (Lustig, 2013).

Another study focused on The Pakistani economy indicated that government spending significantly impacts poverty over the long run, as it plays a critical role in job creation and reducing unemployment, thereby improving living conditions and reducing poverty (Ali, 2010).

In a different context, some studies suggest alternative explanations for mitigating the effects of the relationship between growth, inequality, and poverty. For instance, Gupta's study provided

evidence that high and increasing levels of corruption exacerbate income inequality and poverty, suggesting that policies aimed at reducing corruption could help decrease both inequality and poverty (Gupta et al., 2002). A study conducted on several Arab countries between 1965 and 2009 confirmed that while these countries achieved positive and stable growth rates, the fairness of income distribution initially worsened in the short term, but improved in the medium and long term, helping to reduce inequality. This improvement was largely due to governments prioritizing social considerations over other economic factors (Abdala & Kabdani, 2013[b]).

Another study on the Nigerian economy suggested that population control might be a key solution, as it found that population growth significantly contributed to rising poverty rates. Consequently, birth control measures could play a role in alleviating these rates (Sunkanmi, & Abayomi , 2014). A study conducted on the economies of 119 developing countries between 1970 and 2008 found that food growth has the greatest impact on reducing both poverty and inequality (Imai & Gaiha, 2014).

In light of these studies, the discussion can be summarized as follows: The relationship between economic growth, income inequality, and poverty is complex and interconnected. Some studies underscore the strength and interdependence of these variables, while others highlight the positive correlation between them, and still others confirm that the relationship is inversely related. Furthermore, the proposed solutions to mitigate the repercussions of this relationship vary. Some studies advocate for effective financial policies, such as reducing corruption and improving resource management, while others stress the importance of prioritizing social policies over economic ones. Other recommendations include controlling population growth through birth control programs, or focusing on food growth as a means of reducing poverty and inequality. Despite these differences, many studies emphasize that economic growth, when accompanied by sound fiscal policies, remains a crucial tool for poverty reduction.

3. The Function and Variables of the Study

Economic theory does not provide a specific function to measure poverty. However, previous studies, some of which were presented above, abound with hypotheses, functions, and indicators that help examine, study, and analyze the implications of the relationship between economic growth, income inequality, and poverty. Accordingly, the study's function was developed based on the key variables addressed in prior research, particularly studies with economic structures and environments similar to those of Libya—developing countries characterized by natural resources (Ayad, & Ben Lasheb, 2016; Ayad & Belmaqdad, 2016; Ayad, 2017[b]; Fosu, 2017[d]; Dhrifi, 2013). Thus, the study function was formulated as follows:

$$POV = f(GRW, INQ, INF, Ps_{it}) \quad (1)$$

$$\sum POV_{it} = \beta_0 + \beta_1 \sum GRW_{it} + \beta_2 \sum INQ_{it} + \beta_3 \sum INF_{it} + \beta_4 \sum Ps_{it} + \sum \varepsilon_{it} \quad (2)$$

The poverty rate (per capita consumption rate) of country i in period t is denoted by POV_{it}. The per capita share of GDP of country i in period t is represented by GRW_{it}. The inequality index is expressed by the Theil index for country i in period t, denoted as INQ_{it}. The inflation rate of country

i in period t is represented by INF_{it}, and the political and security stability of country iii in period t is denoted by PS_{it}. The Theil index, used to measure income distributive justice, represents the expected information that converts the population share into the income share. It is calculated using the following mathematical relationship (Bhattacharya & Sinha, 2015):

$$T_{(j)} = INQ_{it} = \Sigma i_{(j)}\, y_{i(j)}\, ln\, (y_{i(j)} / p_{i(j)}) \quad (3)$$

Where: The Theil index, which expresses the population's share of income, is denoted as T(j) =INQT(j). The income of group i of individuals for period j is denoted by y, and the number of individuals in the group is represented by p.

4. Estimating the Study Function

When working with time series data, it's crucial to examine how time impacts the data and determine whether the series are influenced by time. This step is important to avoid drawing conclusions from unreliable or misleading results. On one hand, this helps ensure the analysis is accurate and trustworthy. On the other hand, it helps in choosing the right methodology, which is key to understanding how the variables—or the study's dependent variable—change over time. With this in mind, the relevant tests were conducted, and their results are shown in the table below.

Table 1. presents a summary of the results from the unit root tests (ADF and PP) for the variables in the study function.

Variables	***Unit Root Tests***	***Constant***	***Trend with constant***
POV	*ADF*	1^{st}	1^{s}
	PP	1^{st}	1^{s}
INQ	*ADF*	2^{nd}	2^{nd}
	PP	2^{nd}	2^{nd}
GRW	*ADF*	1^{st}	1^{s}
	PP	1^{st}	1^{s}
INF	*ADF*	1^{st}	1^{s}
	PP	1^{st}	1^{s}
Ps	*ADF*	2^{nd}	2^{nd}
	PP	2^{nd}	2^{nd}

Source: *By Researches*

The results of the unit root tests using the Augmented Dickey-Fuller (ADF) method indicated that the variables in the study function were not stationary at the level. However, after taking the first differences, some variables became stationary, while others did not. When the second differences were applied to the remaining variables, all of them became stationary. The results of the unit root tests using the Phillips-Perron (PP) method were consistent with those obtained from the ADF test.

5.Results of Estimating the Study Function Using the "V. Autoregressive Model"

To eliminate the effects of time on the variables in the study function, and after determining the optimal lag length through "Lag Length" tests- for more information see appendix", the study function was reformulated as follows:

$$\Sigma POV = C_1 \Sigma POV_{-1} + C2 \Sigma INQ_{-1} + C_3 \Sigma GRW_{-1} + C_4 \Sigma INF_{-1} + C_5 \Sigma PS_{-1} + C_6 \quad (4)$$

By estimating Function No. (4), the following results were obtained:

$$POV = 0.887474_{0.0052}\ POV_{-1} + 697.4705_{0.0989}\ INQ_{-1} - 0.026768_{0.0284}\ GRW_{-1} - 2.800067_{0.4525}\ INF_{-1} + 24.60521_{0.3814}\ PS_{-1} + 171.5849_{0.2021} \quad (5)$$

The estimation results of the study function revealed a direct correlation between poverty levels in the previous year (POV_{-1} = 0.89) and poverty levels in the subsequent year (POV). This indicates that the effects of poverty on the Libyan economy persist over time. Such a correlation underscores that the hardships faced by citizens due to poverty are not confined to their immediate circumstances but extend to future generations, exacerbating economic conditions in the long run. Consequently, the analysis demonstrates that neglecting to address poverty today will result in cumulative negative repercussions, making future interventions more challenging. Therefore, it is imperative for policymakers to prioritize sustainable poverty alleviation strategies to prevent the issue from worsening over time.

Regarding income inequality, the study's findings highlight that high levels of income inequality (INQ_{-1}= 697.5) among public sector employees in Libya have a significant positive impact on poverty levels in the following year (POV). This suggests that income inequality directly contributes to rising poverty levels, reflecting the broader social and economic disparities that adversely affect individuals' well-being. These results align with the findings of Jamal (2006) on the Pakistani economy, emphasizing that reducing income inequality is a critical step toward poverty reduction. Thus, adopting policies aimed at narrowing the income gap is essential to accelerate poverty alleviation efforts.

As for the per capita share of the Aggregate Domestic Production (GRW_{-1}= - 0.03) in the previous year, the results indicate an inverse relationship with poverty levels in the current year (POV). This implies that a decline in the per capita share of economic growth leads to higher poverty levels in the future. Therefore, increasing the per capita share of GDP can play a pivotal role in reducing poverty in the short term. This calls for economic policies that focus on equitable wealth distribution and the promotion of social justice.

On the other hand, the analysis revealed no significant effects of the inflation rate (INF_{-1}= -2.80) or political and security stability (Ps_{-1}= 24.61) on poverty levels in the Libyan economy. While these factors are undeniably important, they do not appear to be the primary drivers of poverty in Libya.

These findings are consistent with official data from Libyan oversight institutions. For example, a report by the Tripoli Audit Bureau (2017) revealed that approximately 8% of public sector employees in Libya, working across nine specific sectors, earn 2.5 times the average income of their counterparts in other sectors. Their monthly income exceeds 2,000 Libyan dinars, compared to approximately 800 Libyan dinars for employees in the remaining 20 sectors. This stark wage disparity is not justified by any measurable contribution to economic growth by these higher-earning groups. Despite the fact that all state revenues in Libya are derived from natural resources, this group disproportionately benefits from the current economic structure without actively contributing to development. This reflects both an inequitable exploitation of resources and systemic economic instability due to the mismanagement of public funds.

Therefore, reducing the income gap should be a priority for economic policies in Libya to accelerate the process of poverty reduction and enhance economic and social stability in the country. "For more information regarding diagnostic tests, such as the Breusch-Godfrey Serial Correlation LM Test and other tests, please refer to the Appendices section."

6. Conclusion

6.1. Results

1. The Impact of Previous Poverty Levels on Subsequent Poverty (POV_{-1} and POV): The analysis revealed a strong positive correlation between poverty levels in the previous year (POV_{-1}) and poverty levels in the following year (POV), indicating that poverty in Libya is not merely a temporary phenomenon. Instead, it reflects a cumulative process, with the impact of poverty extending over long periods. This positive correlation underscores the understanding that current poverty levels directly affect future poverty, emphasizing the long-term consequences of ongoing poverty crises.

2.Income Inequality (INQ_{-1}) and Its Impact on Future Poverty (POV), The results showed that income inequality among public sector employees (INQ_{-1}) has a very high elasticity concerning future poverty levels (POV). This means that increasing income inequality significantly contributes to higher future poverty levels. These findings highlight the importance of addressing social and economic inequality, as the repercussions of income inequality directly affect future poverty. This calls for the implementation of policies aimed at reducing income inequality to mitigate future poverty.

3.Per Capita GDP (GRW_{-1}) and Its Inverse Impact on Poverty (POV): The results showed an inverse relationship between per capita GDP for the previous year (GRW_{-1}) and poverty levels for the current year (POV). A decrease in per capita economic growth leads to an increase in poverty levels in the future. Therefore, the results suggest that increasing per capita GDP in the current period is a key factor in reducing poverty in the short term.

4.The Lack of Impact of Some Economic Variables (INF_{-1} and Ps_{-1}) on Poverty in Libya: The results did not show a significant impact of the inflation rate (INF_{-1}) and political and security stability (Ps_{-1}) on poverty levels in the Libyan economy. While these variables are often considered important in many economic studies, the results indicate that poverty in Libya is more closely related to internal factors such as income distribution and economic growth.

6.2. Recommendations

1- Adopting a Progressive Tax System: Adopting a progressive tax system is a brilliant idea. This kind of system generates additional financial resources that the government can use to support people with low wages. It not only promotes fairness but also plays a key role in reducing poverty and its negative effects. By narrowing the gap between the rich and the poor, it helps create a more just and inclusive society.

2- Economic Reform Focused on Reducing Income Inequality: Based on the findings, it is recommended that a comprehensive economic reform program be designed and implemented to

reduce income inequality among various segments of society. This reform should include policies aimed at achieving a more equitable distribution of economic resources, which would significantly contribute to reducing poverty levels over the long term.

3-Abolishing Legislation That Contributes to Income Inequality: Legal steps should be taken to abolish legislation and laws that exacerbate income inequality in Libya. Additionally, it is recommended that the per capita share of the benefits of economic growth be increased in proportion to the incomes enjoyed by the upper classes in the public sector, especially those benefiting from large financial perks, as indicated in the reports of regulatory institutions. This will have an immediate positive impact on reducing poverty levels in Libya.

4-Promoting Economic Growth and Thoughtful Fiscal Policies: The government should adopt fiscal policies that promote sustainable economic growth. Public spending should be increased in essential sectors such as health, education, and commodity support, with a focus on ensuring wealth distribution fairness. This will help reduce economic disparities and contribute to comprehensive development, ultimately reducing poverty.

5- Combating Corruption and Enhancing Transparency: Enhancing transparency in the management of public resources and enforcing anti-corruption policies will significantly reduce income inequality and poverty in Libya. Corruption is a major factor contributing to the concentration of wealth in the hands of a few individuals, which exacerbates poverty and deepens economic disparities.

6-Adopting Policies for Good Resource Management: Implementing policies to improve the management of Libya's natural resources, especially in the oil and gas sectors, can reduce economic gaps and provide sustainable financing for development projects. This should be accompanied by strategies focused on the fair distribution of these resources to ensure all segments of society benefit, thus reducing poverty and enhancing citizens' well-being.

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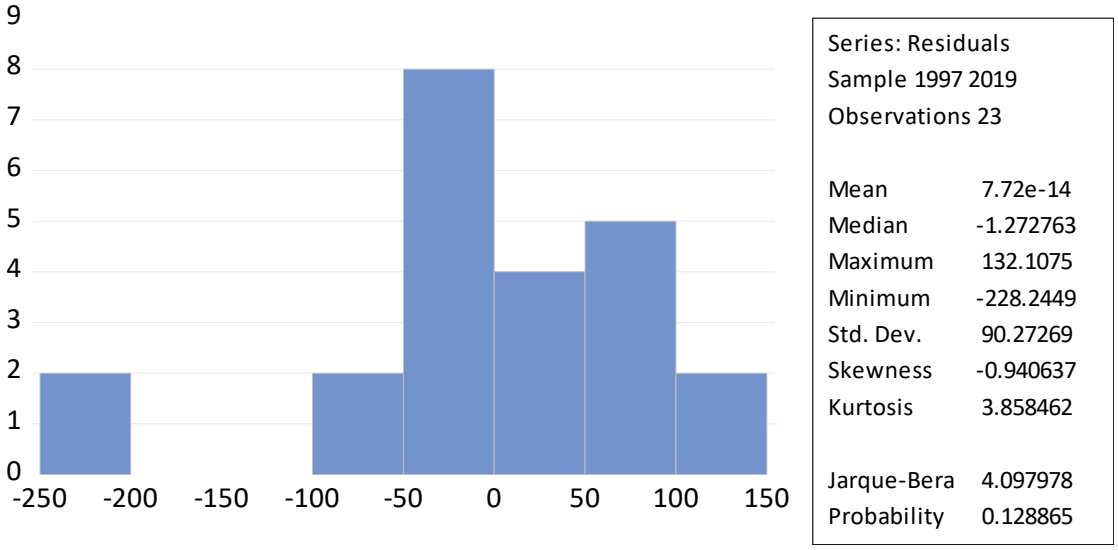
6. Appendices

Table 1. Results of the Lag Length" tests

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-444.7967	NA	6.67e+10	39.11275	39.35960	39.17484
1	-374.2075	104.3492*	1.35e+09*	35.14848*	36.62956*	35.52096*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Fig.1. Results of normal distribution tests for the random variable specific to the study function



Source: *By Researches- E-views 13*

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Table 2. Results of the autocorrelation tests for the random variable specific to the study function

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	1.225052	Prob. F(2,15)	0.3215
Obs*R-squared	3.229344	Prob. Chi-Square(2)	0.1990

Source: *By Researches- E-views 13*

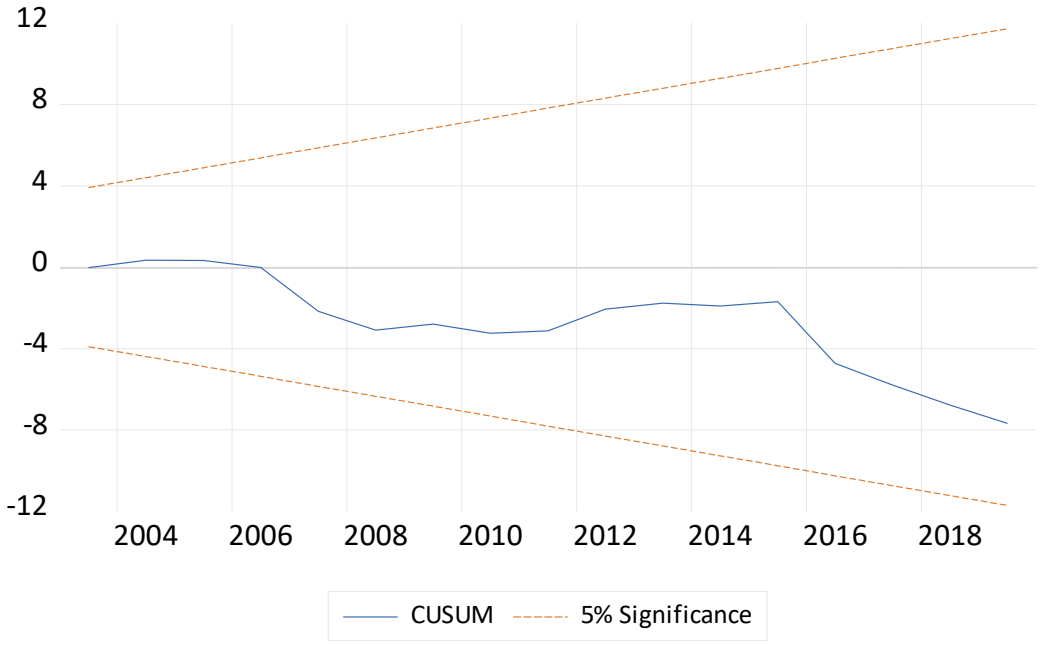
Table 3. Results of the error term variance tests for the random variable specific to the study function

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	2.393301	Prob. F(5,17)	0.0811
Obs*R-squared	9.501651	Prob. Chi-Square(5)	0.0907
Scaled explained SS	7.418971	Prob. Chi-Square(5)	0.1913

Source: *By Researches- E-views 13*

Fig.2. Results of the stability test of the study function



Source: *By Researches- E-views 13.*