Income Inequality and Economic Growth in Nepal

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ABSTRACT

The trade-off between economic growth and income inequality is a subject widely discussed within Economics. Several studies have revealed different relationships while using various methods. This study used data from 1986-2021 for Nepal to reveal the relationship between economic growth and income inequality. The ADF test was used in the beginning to test for unit roots. Then, the study employed Ordinary Least Squares (OLS) to reveal the parameters. The empirical evidence from the model suggested that economic growth in Nepal, as measured, did not have a significant direct effect on income inequality. Rather, inequality has been persistent over the years in Nepal. Moreover, despite an inverted U-shape being hinted, the data did not provide strong enough evidence to confirm this relationship. As a result, policies targeting income redistribution and reduction of structural inequalities need to be employed to tackle the persistent nature of inequality in Nepal.

Key Words: Growth, Inequality, ADF Test, Ordinary Least Squares

1. Introduction

Economic growth and income inequality have faced a rollercoaster journey in Nepal over the last 40 years. Despite the Gross National Income (GNI) per capita increasing from US$160 in 1986 to US$1370 in 2023, the levels of inequality in the country have not changed. Inequality has been a huge issue in Nepal for a very long time. The incompetence of the government in tackling inequality has led to many people fleeing the country in hopes of better opportunities. For instance, the average Gini coefficient of the country between 1986-1991 was 0.505 which increased to 0.55 in the early 2000's. The recent average from 2016-2021 was a shocking 0.513, indicating higher income inequality than over 30 years ago.

The average Palma Ratio between 1986-1991 was 3.23. This figure also highlights Nepal's poor performance in tackling income inequality as the ratio was 3.44 for the average between 2016-

2021. This figure indicates that the Top 10% of the population (the richest) held 3.44 times more income than the Bottom 40% (the poorest) compared to 3.23 times between 1986-1991. Both the Gini coefficient and the Palma ratio have revealed the shocking income inequality in Nepal.

Due to insignificant research testing for the empirical evidence of an inverted U-shaped relationship in Nepal, this research aims to investigate the impact of economic growth on the income distribution of the country. Revealing this relationship is crucial in policy-making and understanding the prevalent trends in an economy.

Figure 1: Lorenz Curve for 1986-1991 and 2016-2021
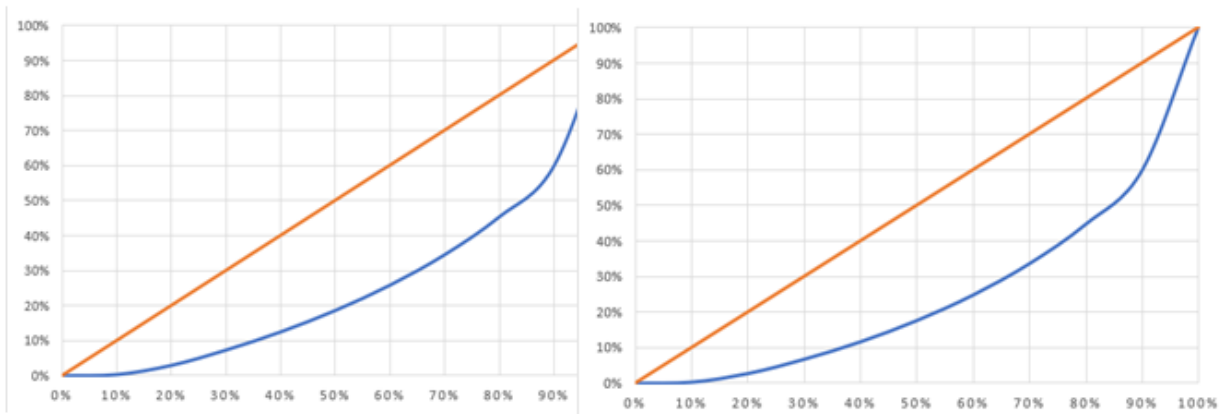
Source: World Inequality Database

Figure 2: Inequality vs Growth in Nepal
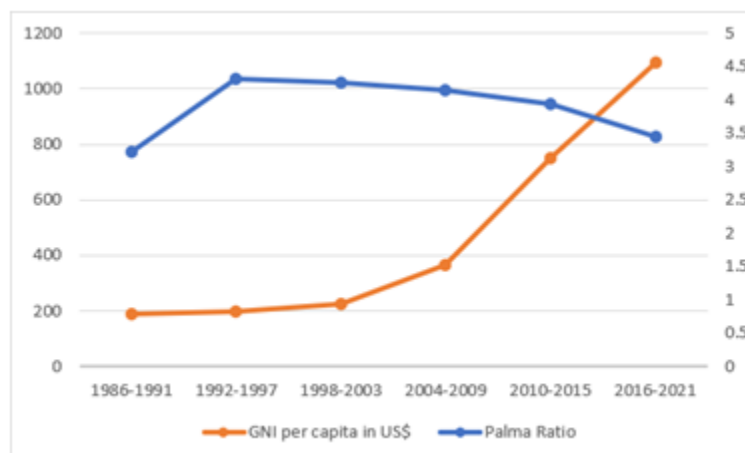
Source: World Inequality Database and World Bank Database

Figure 1 shows the comparison between the Lorenz Curve for Nepal from 1986-1991 and 2016-2021. Both curves are very similar which shows no change in income inequality over time. However, the period between 1991 and 2016 saw greater levels of income inequality, which could have changed the curve during that period. On the other hand, figure 2 graphically represents the Palma ratio and GNI per capita in US$ for Nepal from 1986-2021 divided into six time periods. The Palma ratio peaked in the late 1900's. During this period, economic growth was slower and increasing at a lower rate. However, after the early 2000's there was robust growth in the economy of Nepal. The civil war in the country from 1996-2006 came with huge changes. Monarchy was overthrown and Nepal was declared a republic state. Despite such changes, the condition of inequality across the country was almost the same.

Political instability and corruption are not new issues for Nepal. Across the last 16 years, the government has changed a staggering 15 times. As a result, the government has failed to implement any changes to tackle the inequality spread across the country. However, economic growth has increased as a result of the development of the tourism industry. Moreover, the rapid increase in foreign employment, which has led to high remittances, has also massively contributed to Nepal's GDP. The GDP of Nepal in 1986 was US$ 2.85 billion and reached US$ 40.83 billion in 2022. The volume of financial remittances increased from 2.54 billion USD in 2010/11 to 8.79 billion USD in 2018/19 in Nepal. The increase in remittance volume has also aided in tackling the country's headcount poverty rate. But, this could be a reflection of the lack of opportunities in the country leading to people leaving the country in hopes of earning a living for their family.

2. Literature Review

There have been multiple studies over the years to assess the relationship between income inequality and economic growth. Many studies assessed the relationship using data from several countries. Whereas, some also used single countries to address the topic. Several methods were used across all the studies. There were different outcomes in several studies. Some studies revealed a negative relationship between the variables whereas some revealed a positive relationship between the variables. Several studies showed no relationship and indecisive results as well. Different methods and models were used in different studies.

(Acharya & Acharya, 2022) assessed the relationship between income inequality and economic growth in South Asian countries from 1980-2015. The study employed Fixed effects and Random effects along with GMM. The model was similar to the one used in the Forbes study. The study revealed the relationship between inequality and economic growth is always positive. The paper also revealed that male education seemed to negatively affect the economic growth rate of the countries. The findings suggest that there is a trade-off between equity and efficiency,

highlighting the need for policymakers to consider potential negative effects on growth when implementing policies.

(Majeed, 2016) employed the Autoregressive Distributed Lag (ARDL) technique to study the relationship between inequality and growth in Pakistan, from the years 1975–2013. The study identified a positive relationship between income inequality and economic growth in Pakistan. The research further argued that while inequality positively impacts growth, poverty has a negative effect, suggesting that the benefits of inequality on growth may not be sustainable in the long term. The study concludes that policies should focus on boosting economic growth while simultaneously reducing poverty to ensure inclusive growth and integrate the poor into the growth process.

(Topuz, 2022) examined 143 countries and the periods between 1980 and 2017 through positive and negative channels. These countries are divided into two groups by considering their income levels and they are analyzed with panel data econometric techniques mainly Ordinary least squares (OLS). The study finds that income inequality's impact on economic growth varies by country's income level. In low-income countries, inequality raises fertility rates and harms human capital, while in high-income countries, it increases savings and supports growth. These nuanced effects highlight challenges for policymakers, with future research needed to explore recent impacts like COVID-19.

(Khan et al., 2016) gave a brief overview of Pakistan's economic growth and income inequality, and empirically assessed the relationship between the two variables of the country for 1990 – 2015. The study used the Augmented-Dickey Fuller Test to assess the stationarity of the variables. Then through the use of Ordinary Least Squares (OLS), the study revealed an inverted U-shaped relationship between income inequality and economic growth. The coefficients of variables were statistically significant revealing the relationship between income inequality and economic growth in Pakistan across the years. The study also revealed the importance of several other factors and variables in addressing the relationship between the two variables of the study.

(Bouincha & Karim, 2018) used data from 189 countries for the period between 1990 and 2015 to reveal the relationship between income inequality and economic growth. The study estimated a global model and three other models with countries grouped according to their status of development. The study showed that the impact of income inequality on economic growth differs based on a country's development status. While economic growth remained insignificant in global, developing, and moderately developed country models, the developed country model demonstrated a significant negative relationship, indicating that in more advanced economies, higher income inequality could be detrimental to growth. This suggests that the effect of inequality on growth may be more pronounced in developed nations.

(Knowles, 2005) re-examined the relationship between inequality and growth in 40 countries using comparable data and Ordinary Least Squares (OLS) from 1960–1990. When the sample was divided by income levels, the study revealed a significant negative relationship in low-income countries, indicating that higher inequality impedes economic growth in these nations by limiting access to essential services and opportunities. Conversely, in middle- and high-income countries, the relationship was insignificant, suggesting that other factors might overshadow the impact of inequality on growth.

(Le & Nguyen, 2019) looked into the relationship between income inequality and economic growth in Vietnam from 1998-2016. The results showed a weak direct link between initial inequality and subsequent economic growth. However, income inequality did affect economic growth through several channels. The study identified three key mechanisms affecting the inequality-growth relationship: fiscal mechanisms had minimal impact, imperfect capital markets were beneficial as they improved human capital, and high fertility associated with high inequality negatively affected growth. Several policy implications were recommended in the study: cautious use of redistributive policies, enhancing human capital, and targeting high-inequality, low-development areas for growth improvement.

(Mdingi & Ho, 2023) examined the relationship between income inequality and economic growth in South Africa for the period 1989 to 2018. The study used the autoregressive distributed lag (ARDL) bounds testing technique, and established a long-run relationship between economic growth and income inequality. The results revealed that income inequality harmed economic growth in the long run, but had no effect in the short run. The study also revealed the positive effect of human capital on economic growth. But, variables like government consumption negatively impacted economic growth. The research highlighted the importance of policies targeting the reduction of inequality.

The literature review presents research that used various methods to reveal different relationships between income inequality and economic growth in different regions. While some studies revealed a positive relationship, others revealed negative relationships. Some studies revealed little to no relationship between the two variables. Therefore, we can say that the relationship between the two variables relies on the state of economic development of the selected region.

3. Methodology

3.1 Empirical Methodology & Data

The required data on economic growth is obtained from the World Bank Database, and the data on income share is taken from the World Inequality Database. The data of 36 observations from 1986 to 2021 is used in the study.

This study uses different econometrics tests and techniques. Firstly, the Augmented-Dickey Fuller test is used to check for stationarity in the series of the model. After the ADF test, this study employed the method of ordinary least squares (OLS) to investigate the relationship between economic growth and income inequality.

3.2 Model Specification

According to the Kuznets hypothesis, during the initial stages of development, inequality rises and then starts to decline as development progresses. To analyze this relationship between economic growth and income inequality using data from the economy of Nepal, we use the following log-linear regression model which is based on previous research:

$$INEQ = \alpha + \beta \text{Grow} + \delta \text{Grow}^2 + \pi INEQ_{t-1} + \mu \dots\dots\dots\dots\dots\text{(i)}$$

Where,

- β & δ = *Coefficient of Variables*

- INQ = *Income Inequality*

Income Inequality in this study is the value of the Gini coefficient of Nepal from 1986 to 2021. The Gini coefficient determines a country's level of income inequality by measuring the income distribution across its population. The value of the Gini coefficient ranges from 0 to 1 with 0 being perfect equality and 1 being perfect inequality. The closer the country is to 0, the more equal income distribution is and the closer the country is to 1, the more unequal income distribution is among its population.

- Grow = *Economic Growth*

Economic Inequality in this study is the value of the GDP growth rate of Nepal from 1986 to 2021. The Gross Domestic Product (GDP) measures the value of the total final output of goods and services produced by an economy in a certain period (usually a year). The GDP growth rate measures the change in the value of GDP compared to the previous year.

- Grow^2 = *Square of Economic Growth*

- $INEQ_{t-1}$ = *Income Inequality of One Year Lag Period*

- μ = *Error Term*

The expected signs of β are> 0, δ < 0 and of π is > 0

3.3 Descriptive Statistics

Descriptive statistics helps to organize, summarize, display, and describe data and present it meaningfully. The maximum and minimum values of economic growth are 9% and -2.4% respectively. This shows a great difference between the two values highlighting the huge fluctuations within the Nepalese economy. On the other hand, the maximum and minimum values of income inequality are 0.5641 and 0.48687 respectively. There is a very small difference between the two values. The data points from 1986 and 2021 have been removed resulting in 34 observations in this research. Moreover, looking into other descriptive statistics can provide valuable insights into a dataset.

Table I: Descriptive Statistics of the Variables

	Economic Growth	Income Inequality
Mean	4.42058824	0.538848375
Median	4.45	0.540658853
Maximum	9	0.56406552
Minimum	-2.4	0.486870447
Standard Deviation	2.25372625	0.016598008
Skewness	-0.615597397	-1.19382349
Kurtosis	4.29499715	5.38899479
Sum	150.3	18.3208448
Sum Sq. Dev.	172.695588	0.009091297

Observations	34	34

Source: Author's Calculations

4. Unit Root Test Results

Moving on, we test for a unit root to find whether the model's variables are stationary or non-stationary at the level. For this, the augmented test developed by (Dickey & Fuller, 1981) will be used which is a key part of this research. Thus, the results of the ADF test are reported in Table 2 and Table 3.

Table 2 represents the results of the Augmented-Dickey Fuller test for economic growth.

H_0 = Grow has a unit root

H_1 = Grow has no unit root

The value of the test statistic for economic growth (Grow) is -5.9768. The p-value is 0.01 which is significant at 5%. The p-value initially was slightly higher than the significant value. However, through first differencing, stationarity was achieved. First differencing effectively removes linear trends and makes it easier to model short-term changes and fluctuations. Therefore, the test results reject null and accept the alternative hypothesis. It is concluded that the economic growth data is stationary at this level.

Table II: ADF Test Result for Economic Growth (Grow)

		t-statistic	p-value
ADF Test Result		-5.9768	0.01
Test critical values:	At 1%	-3.58	
	At 5%	-2.93	
	At 10%	-2.60	

Table 3 represents the results of the Augment-Dickey Fuller test for income inequality.

H_0 = INEQ has a unit root

H_1 = INEQ has no unit root

The value of the test statistic for income inequality (INEQ) is -3.7149. The p-value is 0.03901 which is significant at 5%. Therefore, the test results reject null and accept the alternative hypothesis. It is concluded that the income inequality data is stationary at this level.

Table III: ADF Test Result for Income Inequality (INEQ)

		t-statistic	p-value
ADF Test Result		-3.7149	0.03901
Test critical values:	At 1%	-3.58	
	At 5%	-2.93	
	At 10%	-2.60	

Looking into the results from Table 2 and Table 3, both variables are stationary at level. We can now estimate the model using regression analysis as both series of the model are stationary at level.

5. Model Estimation

To empirically assess the hypothetical relation between income inequality and economic growth, that the relationship is significant or not, this study uses the following selected regression model:

$$INEQ = c + \alpha Grow + \beta Grow^2 + \pi INEQ(-1) + \mu \ldots\ldots\ldots\ldots\ldots\ldots(ii)$$

In the above regression (ii), INEQ is the dependent variable, and the Grow or $Grow^2$ are independent variables. INEQ(-1) represents a one-year lag of the dependent variable. The coefficient of variables represents the percentage change in the dependent variable due to the change in the independent variable.

To assess the relationship between economic growth and income inequality, the model is run in R and the results are given below in Table 4.

Table IV: Regression Results of the Model

Period: 1986-2021

Variable	Coefficient	Std. Error	t-statistic	p-value
c	0.14157	0.072198	1.961	0.05992
Grow	0.00011840	0.00050997	0.232	0.81810
Grow^2	-0.000030328	0.000061476	-0.493	0.62562
INEQ(-1)	0.73978	0.13284	5.569	0.000005876
R^2	0.5421	Mean Dep. Variable		0.538848375
Adjusted R^2	0.493	S.D. Dep. Variable		0.016598
Std. Error of Regression	0.0031			
D-W Stat	2.11057			

6. Results and Discussion

Based on the results presented in the table, we can analyze the relationship between income inequality and economic growth along with the significance of the coefficients. Column 1 lists the variables included in the model, Column 2 provides the coefficient estimates of the independent variables and Column 3 provides the standard error values. Columns 4 and 5 show

the t-statistic and p-values, respectively, which help determine whether the coefficients are statistically significant.

Firstly, the constant term is positive and significant at the 10% level with a p-value of 0.05992. This highlights the baseline level of income inequality when other factors are zero. The estimated value of the coefficient of economic growth (Grow) is 0.00011840 and statistically insignificant. Similarly, the coefficient of the squared term of economic growth (Grow²) is -0.000003028 and statistically insignificant as well. This suggests that economic growth and its quadratic term have no significant direct impact on income inequality in this model. The coefficient of the lagged income inequality variable (INEQ(-1)) is positive, with a value of 0.73978, and is highly significant at the 1% level. This indicates that past levels of inequality have a strong influence on current inequality, highlighting the persistence of inequality over time in Nepal. The impact of economic growth on inequality appears to be insignificant in this model highlighting Nepal's failure in tackling inequality for a long time.

However, since $\alpha > 0$ and $\beta < 0$, the coefficients suggest an inverse U-shaped relationship between economic growth and income inequality, where income inequality first increases with growth and then decreases after reaching a certain level of growth. The insignificance of the coefficients means that while the pattern hints at an inverted U-shape, the data does not provide strong enough evidence to confirm this relationship. Thus, economic growth might not have a substantial or clear impact on income inequality in Nepal.

The R-squared value is 0.5421, which indicates that the independent variables explain approximately 54% of the variation in income inequality. The adjusted R-squared value is slightly lower at 0.493. Initially, the value of the Durbin-Watson statistic was 0.62393 which showcased autocorrelation between the variables. However, after implementing the Cochrane-Orcutt method, we got a revised Durbin-Watson statistic. The use of the Cochrane-Orcutt method, however, did not change the significance of coefficients compared to when it was not used. Finally, the revised Durbin-Watson statistic is 2.11057, which suggests that the model does not suffer from the problem of serial correlation. This further supports the reliability of the regression results.

7. Conclusion

The results of the study allowed us to look into the relationship between economic growth and income inequality in Nepal. The observation spanned from 1986-2021 and allowed us to look into relationships across 36 years. The ADF test was used in the beginning to test for unit roots. Then, through the use of Ordinary Least Squares (OLS), we estimated several parameters to reveal the relationship between economic growth and income inequality. As revealed by the

study, economic growth did not significantly impact income inequality in Nepal. Even though the coefficients suggested an inverse U-shaped relationship between the variables, they were not statistically significant. Therefore, this study was able to reveal the persistent nature of inequality that has been prevalent for a very long time.

Nepal's economy is marked by a huge reliance on agriculture, a large informal sector, and a relatively small manufacturing industry. Economic growth in Nepal's economy might not be widespread enough to affect income inequality significantly. Economic growth may be prevalent in certain sectors, while the others are left untouched. Moreover, extreme poverty levels along with low access to essential services like healthcare and education might mean that economic growth does not result in a significant decrease in inequality. As a result, the benefits of economic growth are obtained by those already better off, leaving the inequality level relatively unchanged.

The empirical evidence from our study suggests that economic growth in Nepal does not have a significant direct effect on income inequality. Even though an inverse U-shaped relationship between economic growth and inequality was suggested, they were not statistically significant. The findings could be influenced by a variety of factors, like the structure of the economy, the nature of growth, and potential data limitations. The persistence of inequality over time highlights the need for policies targeting income redistribution and reducing structural inequalities. Moving on, further research and more sophisticated models might provide deeper insights into how different aspects of growth and other factors affect inequality in Nepal.

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