Effects of economic growth, trade expansion, poverty on income inequality in provinces in Vietnam

Le Xuan Thai[1], Nguyen Van Tac[2]

[1]*Mekong Institute, CanTho University, Road 3/2, Ninh Kieu Ward, Can Tho, Vietnam*
[2]*Faculty of Economic, South-CanTho University, 168 Nguyen Van Cu Str., An Binh Ward, Can Tho, Vietnam*

Abstract

The objective of this research is to determine the impact of economic growth, investment capital, budget expenditure, trade expansion, poverty, institutions on income inequality in provinces in Vietnam. This research utilized data collected by the General Statistics Office of Vietnam from 2016 to 2022, combined with the Vietnam Household Living Standard Survey reports from the same period. Empirical results derived from Two-Stage Least Squares (2SLS) regression method reveal that economic growth, trade expansion, budget expenditure on medical care and poverty have effects on income inequality in provinces. Economic growth and poverty rate have positive impacts on income inequality in provinces; in contrast, trade expansion and budget expenditure on medical have negative impacts on income inequality in provinces. There is a significant difference in income inequality among regions in Vietnam.

Keywords: economic growth, income inequality, trade expansion, budget expenditure.

JEL classification: D63, F14, I32, O15, R11.

1. Introduction

Income inequality is an essential form of social inequality that is often a concern in many countries. Kuznets (1955) proposed that income inequality initially increases during the early stages of economic development but decreases in later stages. In contrast, a small part of the population has a relatively high income due to differences in income across population groups, driven by resource distribution and economic opportunities. The relationship between economic growth and income inequality is always a significant concern in developing countries. The linkage between economic growth and income inequality should be evaluated across different socio-economic contexts and within the relevant theories. Economic growth in the Asian countries has been accompanied by rising income inequality in recent years. In a study examining the effects of economic growth and institutional quality on poverty and income inequality in Asia during 1985-2009, Perera and Lee (2013) concluded that economic growth did not affect income inequality. Conversel

2. Theoretical background and literature review

2.1. Theoretical background

Income inequality increases during the early stages of economic growth, but decreases in the later stages (Kuznets, 1955). This pattern results from workers moving from the agricultural sector, where wages are low, to the industrial sector, where wages are higher. Nevertheless, income distribution remains unequal, leading to greater income inequality, especially as the relative wages of poor workers lag in both urban and rural areas. Ultimately, income inequality in the economy will decrease as economic development progresses.

Galor and Zeira (1993) and Aghion *et al*. (1999) analyzed the impact of capital on income inequality, based on the imperfect functioning of capital markets, and concluded that low investment in human capital in some countries leads to low economic growth. An increase in income distribution enables people experiencing poverty to invest in their families' human capital, thereby boosting production and promoting economic growth. Therefore, the impact of imperfect capital markets is significant in poor countries. The theory suggests that investment in capital and education expenditure influence changes in income inequality across countries.

The political economy theory of Alesina and Rodrik (1994) regarding the impact of economic growth on income inequality indicates that the middle class in democratic societies determines tax rates. Taxes are assumed to be proportional to income, and public expenditure may be increased because tax revenues are distributed to everyone. In this case, the benefits for the poor are greater than those for the rich. In an unequal society, the middle class's

income may be lower than the average. The adverse effects of income inequality can be magnified when wealth is not distributed towards people experiencing poverty, resulting in fewer opportunities to reduce it through redistribution.

These theories show that the relationships among economic growth, investment capital, education spending, and income inequality can go in many directions, making it necessary to consider the channels that drive income inequality.

2.2. Literature review

Van and Pham (2024) found that population size is negatively correlated with income inequality. Population size in urban areas has a positive impact on reducing income inequality. However, population growth tends to increase income inequality because occupational divisions are driven by the needs of the economy. Moreover, attracting highly skilled workers moving to economic development areas creates a labour migration flow and increases inequality in society. We hypothesize that population size negatively affects income inequality.

Kuznets (1955) concluded that economic growth increases income inequality in developing countries in the early stages of economic development. Hung *et al.* (2020) concluded that economic growth negatively affects income inequality. The results of Dang (2019) indicated that the relationship between economic growth and income inequality is a positive U-shaped in Southeast Asia countries. This study hypothesizes that economic growth negatively affects income inequality within localities.

Le *et al.* (2021) concluded that FDI capital tends to increase income inequality in Vietnam. Dang (2019) and Le and Bentzen (2022) concluded that the ratio of investment capital to GDP does not affect income inequality in ASEAN countries. It is hypothesized that investment capital negatively affects income inequality.

According to Mankiw (2016), the application of scientific and technological advances in production alters workers' wages and increases income inequality. Hoang and Le (2024) concluded that technological improvements affect income changes across localities in Vietnam; as a result, the higher a locality's level of technology, the greater the rise in income inequality. We propose that investment in science and technology reduces income inequality.

Improving the quality of human resources makes income distribution more equal (Nguyen, 2019). Investment in education and healthcare may reduce income inequality in the long run (Tran, 2024). Van and Pham (2024) concluded that a surplus supply of skilled labour can lower skilled workers' wages and thereby reduce income inequality. This suggests the hypothesis that investment in education and healthcare reduces income inequality.

The trend of income inequality in Vietnam has been rising in recent years, driven by trade openness and international economic integration. Le and Bentzen (2022) conclude that changes in trade activities lead to changes in income inequality in less developed regions. Easier market access across all sectors of the economy is a solution to reducing income inequality in the long run. We expect that trade expansion negatively affects income inequality.

According to Nguyen and Pham (2018), poverty is correlated with income inequality; as income inequality increases, people experiencing poverty are severely affected. The poverty rate is susceptible to a reduction in inequality. It is expected that poverty rates have a positive impact on income inequality within localities.

According to Hung *et al*. (2020) and Hoang and Le (2024), high-quality governance supports economic growth and reduces income inequality at the local level. Beyene (2024) concluded that governance institutions play an essential role in reducing the negative impact of economic growth on income inequality in African countries. We hypothesize that governance institutions negatively affect income inequality.

Benjamin *et al*. (2017) concluded that income inequality is less pronounced between urban and rural areas and among localities. However, Tran and Ngo (2024) conclude that inequality is especially pronounced in metropolitan regions, where living costs are higher, and job opportunities are scarcer for those with lower educational attainment. Finally, we propose that socio-economic geography affects income inequality.

3. Methodology and data

The indicators using in this study include the GINI index, which is the dependent variable, and independent variables, including gross regional domestic product, population size, total capital investment, state budget expenditure on science and technology, expenditure on education, spending on healthcare, domestic trade measured by retail sales of goods and servies, the poverty rate in localities, and governance and public administration performance. These data were collected from the National Statistics Office (NSO) of Vietnam, and the Centre for Community Support Development Studies (CECODES) under the United Nations Development Programme (UNDP) in Viet Nam from 2016 to 2022.

The GINI index is used in this study because it is widely used to assess income inequality across communities, localities, and regions in many countries. GINI index ranges from 0 to 1. Based on the GINI index, the researchers can divide income inequality into three categories: low income inequality when the GINI index is lower than 0.4; medium income inequality when the GINI index ranges from 0.4 to 0.5; high income inequality when the GINI index is higher than 0.5. The GINI index rises closer to 1, the higher the income inequality in society.

The GINI index is established based on the Lorenz curve, which is created by two factors: the cumulative income ratio of the population and the ratio of corresponding cumulative population (Lorenz, 1905), according to the following formula:

$$G = 1 - \sum_{i=1}^{n} (F_i - F_{i-1})(Y_i - Y_{i-1})$$

Where F_i is the cumulative percentage of the group i, and Y_i is the cumulative percentage of income for the group i.

A GINI index between 0.3 and 0.45 is a reasonable range for many countries aiming to achieve high economic growth.

Data on income distribution were calculated by the authors from the Vietnam Household Living Standard Survey data set for 2022. To analyse the impact of economic geography on income inequality in localities, the study uses dummy variables for six socio-economic regions as follows: 1- Northern Midland and Mountainous Regions, 2- Hong River Delta, 3- North Central and Central Coastal Regions, 4- Central Highlands, 5- Southeastern Region, 6- Mekong River Delta.

We present a model estimating the impact of various factors on income inequality in localities as follows:

$$IE_{it} = \beta_0 + \beta_1 lnPOP_{it} + \beta_2 lnGRDP_{it} + \beta_3 lnCAP_{it} + \beta_4 lnTECH_{it} + \beta_5 lnTRADE_{it} + \beta_6 lnEDU_{it} + \beta_7 lnMED_{it} + \beta_8 POV_{it} + \beta_9 PAPI_{it} + \beta_{10} ZONE_{it}$$

TABLE 1: **Definition of variables in the research model**

Definition of variable	Indicator	Expectation sign	Previous studies
Dependent variable			
Income inequality (GINI)	IE		Nguyen (2019), Hung *et al.* (2020)
Independent variables			
Population size	POP	-	Van and Pham (2024)
Gross regional domestic product	GRDP	-	Dang (2019), Hung *et al.* (2020)
Total investment capital in locality	CAP	-	Le *et al.* (2021)
Expenditure on science and technology	TECH	-	Mankiw (2016), Hoang and Le (2024)
Expenditure on education	EDU	-	Le *et al.* (2022), Tran (2024)
Expenditure on healthcare	MED	-	Nguyen (2021), Tran (2024)

Domestic trade: retail sales of goods	TRADE	-	Le and Bentzen (2022)
Rate of poverty in locality	POV	+	Nguyen and Pham (2018)
Public administration performance index	PAPI	-	Beyene (2024), Hoang and Le (2024)
Social-economic region	Zone		Tran and Ngo (2024)

Source: Compiled by the authors.

Firstly, the study uses a pooled OLS regression model to assess the impact of factors on income inequality across localities. Subsequently, after testing for heteroscedasticity (using the White and Wald tests), the study uses the Feasible Generalized Least Squares (FGLS) regression model to address heteroscedasticity. To mitigate the influence of endogenous variables on the GRDP variable, the Two-Stage Least Squares (TSLS) regression model, with instrumental variables such as population size, total investment capital, and budget expenditure on science and technology, is used to improve the reliability of the estimation results. The reason is that GDP is affected by many factors such as population size, labor population, investment capital, and expenditure on science and technology (Lien *et al*., 2020; Tran *et al*., 2020). In this study, using three instrumental variables, such as population size, investment capital, and budget expenditure on science and technology investment, helps control for the endogenous phenomenon in the estimation model.

The study uses data from the annual reports of the National Statistics Office (NSO) of Vietnam and the Vietnam Household Living Standard Survey (VHLSS) report for 2022 to collect socio-economic data from provinces and establish research data. PAPI data were collected from the National Statistics Office (NSO) of Vietnam and the Centre for Community Support Development Studies (CECODES) under the United Nations Development Programme (UNDP) in Viet Nam from 2016 to 2022.

The time series data covers the years 2016 and 2018. 2019, 2020, 2021, and 2022. A total of 378 observations from provinces and municipalities in six years were included. The study excluded eight observations due to missing data, resulting in a final sample of 370 for analysis.

The analysis of the indicator sample distribution in Table 2 shows that the variables are not normally distributed. The evaluation of skewness and kurtosis for the research indicators shows significant fluctuations in indicator values across localities. Indicators such as total investment capital, retail sales of goods, and budget expenditure on education and training are less skewed compared to the others. The fluctuations in these variables across localities are likely to lead to heteroscedasticity in the regression model.

TABLE 2: **Descriptive statistics**

Indicator	Mean	Max.	Min.	S.D.	Skewness	Kurtosis
GINI	0.347	0.491	0.188	0.048	-0.326^{**}	3.608^{**}
lnPOP	7.129	9.147	5.729	0.578	0.926^{***}	5.423^{***}
lnGRDP	11.201	14.219	6.592	0.910	0.419^{***}	5.697^{***}
lnCAP	10.201	13.027	6.822	0.922	0.015	5.320^{***}
lnTECH	5.022	8.412	1.386	0.946	0.734^{***}	5.280^{***}
lnTRADE	10.461	13.291	8.102	0.870	0.163	4.193^{***}
lnEDU	7.990	9.728	4.917	0.499	0.157	8.582^{***}
lnMED	6.658	8.871	3.109	0.578	-0.521^{***}	8.833^{***}
POV	8.79	53.93	0	9.52	1.835^{***}	6.201^{***}
PAPI	41.86	48.81	32.59	3.26	-0.859^{***}	3.237

Note: *** ; ** indicate significance at 1%, 5% levels, respectively.

Source: Calculated by the authors.

TABLE 3: **Correlation matrix**

Indicator	GINI	lnPOP	lnGRDP	lnCAP	lnTECH	lnTRADE	lnEDU	lnMED	POV
lnPOP	-0.411								
lnGRDP	-0.444	0.861							
lnCAP	-0.431	0.755	0.796						
lnTECH	-0.223	0.680	0.767	0.643					
lnTRADE	-0.510	0.850	0.837	0.731	0.679				
lnEDU	-0.132	0.773	0.640	0.621	0.602	0.537			
lnMED	-0.165	0.661	0.535	0.461	0.532	0.490	0.765		
POV	0.634	-0.530	-0.639	-0.551	-0.444	-0.707	-0.128	-0.116	
PAPI	-0.193	0.041	0.148	0.178	0.154	0.130	0.167	0.163	-0.223

Source: Calculated by the authors.

The results of the correlation matrix in Table 3 show that most variables are negatively correlated with the income inequality variable. The variables of population size, total investment capital, and retail sales of goods are positively and closely associated with the GRDP. Retail sales of goods are negatively and closely correlated with the poverty rate. From these results, it can be inferred that the development of trade and services in localities helps residents consume goods, reduces sales costs, and decreases the poverty rate. Due to cross-correlation among variables, endogeneity may arise, leading to instability in the estimation results.

4. Empirical result and discussion

The results of the Pooled-OLS regression model in Table 4 show that state expenditure on science and technology, state expenditure on healthcare, trade expansion, and the poverty rate affect income inequality at the local level. The White test for heteroskedasticity indicates heteroskedasticity in the regression model. Income inequality in the Hong River Delta is lower than in the Northern Midland and Mountainous Regions. Conversely, income inequality in the Central Highlands is higher than in the Northern Midland and Mountainous Regions.

The panel data analysis indicates heteroscedasticity in the regression model (the Wald test is significant at the 1% level). The FGLS regression (with heteroscedasticity correction) is used to achieve robust estimation. The analysis results show that budget expenditure on science and technology, budget expenditure on healthcare, trade expansion, and the poverty rate affect income inequality in localities. A comparison of income inequality across zones shows that it is lower in the Hong River Delta than in the Northern Midlands and Mountainous Regions. At the same time, it is higher in the Central Highlands than in the Northern Midlands and Mountainous Regions.

To address endogeneity in the variables affecting GRDP, the study uses population size, total investment capital, and budget expenditure on science and technology as instrumental variables for GRDP in the TSLS regression model. The Wu-Hausman test indicated that there is no endogeneity in the TSLS regression model later. However, the Sagan test revealed an overidentifying restriction in the analysis results. Given the research purpose, the presence of excessive instrumental variables is accepted in this result, as these variables have been shown to affect the GRDP in previous results. The results of the TSLS regression model show that GRDP, healthcare budget expenditure, trade expansion, and the poverty rate affect income inequality in localities. Income inequality in the Red River Delta is lower than in the Northern Midlands and Mountainous Regions, while it is higher in the Central Highlands. Budget expenditure on education and institutional quality has no impact on income inequality.

The results show that gross regional domestic product has a positive impact on income inequality. The research result is consistent with Dang's (2019) finding, but it is contrary to Hung *et al*. (2020) conclusion. An examination of Vietnam's economic prospects from 2016 to 2022 shows that Vietnam remains below the low-middle income threshold, suggesting that income inequality is moving in the same direction as economic growth, consistent with Kuznets's inequality theory (1955). A one-point increase in the gross regional domestic product (lnGRDP) is associated with a 2.31 percent increase in the income inequality, as measured by the GINI index. This result shows that rapid economic development in provinces will significantly increase income inequality in the population.

The results show that trade expansion reduces income inequality. Dollar *et al*. (2016) concluded that an increase in a country's trade value can positively affect economic growth and improve income distribution. This result shows that trade expansion in localities helps reduce income inequality; it is similar to the finding of Dollar *et al*. (2016) but contrary to the conclusion of Le and Bentzen (2022). A one-point increase in trade expansion of goods and services (lnTRADE) is associated with a 1.8 percent decrease in income inequality, as measured by the GINI index. To reduce income inequality, local governments should focus on trade in goods and services and promote the sale and consumption of local products. According to the comparative investment theory, trade expansion can take advantage of surplus labor in localities, increase workers' income, and make income distribution more equitable.

Budget expenditure on healthcare reduces income inequality. Increasing healthcare budget expenditures reduces pressure on medical costs for people on low incomes and older adults in ASEAN countries (MFS, 2015). The research results show that increased healthcare budget expenditure reduces income inequality in localities, similar to findings in Singapore. This finding is the first of its kind in Vietnam. In developed countries, increasing budget expenditure on medical services helps make healthcare services more equitable for people and reduces income inequality (Kjellsson and Gerdtham, 2014). The research results have verified the effectiveness of state healthcare expenditure in reducing income inequality in Vietnam.

The research results show that a reduction in the poverty rate in localities will lead to a decrease in the income inequality index. The result is similar to the conclusion of Nguyen and Pham (2018). Therefore, reducing the poverty rate serves as a dual solution for localities with high levels of poverty and income inequality.

This study finds differences in income inequality among geo-economic regions. The differences in income inequality across regions stem from differences in local natural conditions. The research results support the conclusions of Nguyen *et al*. (2010) and Tran and Ngo (2024). The differences in natural, social, and economic conditions across regions have created varying income-generating opportunities for residents, leading to disparities in income among population groups within these regions.

The results do not find an impact of budget expenditure on education and training, and governance institutions on income inequality. Aghion *et al*. (1999) concluded that reinvestment in education and training reduces income inequality; we do not find that impact in this study. Some studies concluded that improving governance institutions reduced income inequality (Hung *et al*., 2020; Beyene, 2024). Pham (2022) concluded that institutional quality did not change income inequality. The research results support the above conclusion and are inconsistent with the conclusions of Hung *et al*. (2020) and Beyene (2024).

TABLE 4: **The impacts of factors on income inequality in Vietnam**

Variable	Pooled-OLS	FGLS (h)	2SLS
Constant	0.4649***	0.3945***	0.371***
lnPOP	-0.0107	-0.0082	
lnGRDP	0.0017	0.0018	0.0213**
lnCAP	-0.0002	0.0036	
lnTECH	0.0113***	0.0059**	
lnTRADE	-0.0116**	-0.0087*	-0.0178***
lnEDU	0.0118	0.0034	-0.0009
lnMED	-0.0098*	-0.0082**	-0.0100*
POV	0.0022***	0.0026***	0.0026***
PAPI	-0.0010	0.0005	-0.0005
Northern Midland and Mountainous Regions	-	-	-
Hong River Delta	-0.0204**	-0.0213***	-0.0297***
North Central and Central Coastal Regions	-0.0062	0.0033	-0.0060
Central Highlands	0.0202**	0.0373***	0.0215**
Southeastern Region	-0.0028	0.0027	-0.0128
Mekong River Delta	0.0058	0.0104	0.0041
Obs.	370	370	370
R^2 (%)	48.9		45.5
Model test value	24.28***	440.9***	320.2***
Test of			
- Heteroskedasticity	White (psss) =	130.9**	
	Wald (psss) =	3678***	
- Endogeneity	Wu-Hausman =	2.59 ns	
- Overidentifying	Sagan =	11.71***	

Note: ***, ** , * indicate significance at 1%, 5%, 10% levels, respectively.

5. Conclusion

Economic growth in localities helps improve people's incomes and living standards, but it also increases income inequality. Therefore, economic development policies in localities should incorporate several measures to reduce income inequality among affected groups, such as social welfare programmes covering healthcare, education, and other social services.

Trade expansion in localities reduces the influence of geographic constraints on commodity production, supports local production for people, creates advantages for local goods consumption, and reduces income inequality in localities. Local governments should formulate policies to develop transport infrastructure and logistics to facilitate the consumption of local products, and to promote the image of production areas or types of goods to consumers.

Rising healthcare expenditure has reduced income inequality in society. The influence of budget expenditure on healthcare in lowering income inequality has been found for the first time in Vietnam. This result demonstrates the effectiveness of the healthcare programs for people in rural areas. When people have easier access to healthcare services, they can improve their health, increase labor participation, and earn higher incomes.

The application of scientific and technological advances creates income inequality by providing unbalanced advantages to highly educated workers, thereby playing an essential role in widening income gaps. Investment in science and technology advances will increase the gross regional domestic product in the locality, but it also contributes to income inequality in society.

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