Urbanization and Income Inequality in Vietnam: An Empirical Investigation at Provincial Level.

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Abstract

The article studies the impact of urbanization on income inequality in Vietnam, using panel data for 63 provinces and cities in the period 2010-2018. The study applies the fixed-effects regression model estimation method with the standard error of (Driscoll & Kraay, 1998) to test the relationship between urbanization and income inequality in Vietnam. Besides, the study also considers this relationship under the influence of human capital. The study has found that urbanization tends to increase income inequality in localities. On the other hand, urbanization can reduce the income inequality between rich and poor under the influence of human capital. Based on the research results, the study has some policy implications for state agencies in realizing the goals of equality and social justice through the process of urbanization, contributing to solutions for the common socio-political stability of the country.

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1. Introduction

In developing countries, the development process changes not only the size of national output or the level of technology but also economic relationships and social structures. The development process leads to significant changes in the income level of individuals; however, a segment of society often benefits more from increased income. Therefore, the development process can change the distribution of income. For example, the income of a particular section of society increases relatively more than that of the rest of society. Currently, the world faces a relatively severe gap between rich and poor, especially in developing and underdeveloped countries. The income gap between the wealthy and other groups has widened significantly. For example, in Asia, the incomes of the poorest 70% have decreased, while the incomes of the wealthiest have increased significantly (Hardoon et al., 2016).

The early stages of development are often associated with industrialization. During industrialization, individuals in urban areas benefited from increased labor productivity and a widening disparity in per capita income between urban and rural areas. Living conditions, employment opportunities, and growing interests in urban areas also change the internal structure of society. Many individuals in rural areas decide to migrate to urban areas to take advantage of industrialization and seek higher income in urban areas. Many migrants may be unskilled workers in search of informal urban work. On the other hand, skilled workers also choose to migrate to urban areas to exploit urban benefits and have additional concerns about living and working conditions, education, or remittances back home. Cities are places that create many jobs and incomes for workers. Besides, this is a large and diverse consumer of goods, a place to use a high-quality labor force, and modern technology and infrastructure facilities. Cities can strongly attract domestic and foreign investment. However, urbanization can also stagnate rural production due to labor movement from the countryside to the city. Urban areas are under pressure from unemployment, infrastructure overload, pollution, and unsecured social security. Urbanization results in a structural transformation by shifting resources from less productive sectors like agriculture to more productive sectors such as manufacturing and services. Several studies suggest that urbanization and industrialization are essential for a country to attain a middle- or high-income position (Nguyen & Ngo, 2023).

There have been many studies on the relationship between urbanization and income inequality in many countries around the world; however, in Vietnam, the number of studies on the relationship between urbanization and income inequality is still low. So far, only research by (Ha et al., 2019) has examined Kuznets' inverted U-shaped hypothesis to test the non-linear relationship between urbanization and income inequality. Our model uses the Gini coefficient and the Theil index to represent income inequality. However, there are currently no studies using the income inequality coefficient to examine the impact of urbanization on income inequality. In addition, studies have not explored the relationship between urbanization and income inequality under the influence of several regulatory factors. Therefore, the primary purpose of this study is to empirically investigate the direct impact of urbanization on income inequality and the impact of urbanization on income inequality with the moderating effect of provinces' levels of education. Therefore, in this article, besides building a model of the impact of urbanization on income inequality, the authors will consider this relationship under the influence of regulatory factors.

2. Theoretical Framework and Literature Review

2.1. Theoretical framework

The approach of Kuznets (1995) is considered one of the essential frameworks for explaining how development and urbanization affect inequality. Besides the theory of Kuznets (1955), there are also theories of migrant workers by Lewis (1954) and Todaro (1969). The article will present three main theoretical frameworks explaining the relationship between urbanization and income inequality, including Lewis's Two-Region Model (1954), Kuznets' Inverted U-curve Theory (1955), and Todaro's Migration Model (1969).

2.1.1 Kuznets' inverted U-curve theory (1955)

According to Kuznets (1955), urbanization, followed by industrialization, is an essential factor leading to the increase in inequality. Kuznets (1955) considers industrialization and urbanization as processes that develop at the same time. In his research, Kuznets (1995) found demographic changes after industrialization and how this changed income distribution within a country. His research has shown that urbanization is an important factor affecting income inequality.

Urbanization can change overall inequality through three factors. First, as urban proportions increase, urban inequality contributes more to overall inequality. Second, industrialization can widen the gap between urban and rural areas; however, the impact of industrialization will be offset by factors such as the spillover of technology and changes in trade. Third, development can change both rural and urban inequalities.

In Kuznets' theory, development can yield unequal benefits, and the early stages of industrialization are associated with higher inequality. The author argues that an increase in the urban population means increasing the share of unequal income distribution. Thus, according to Kuznets, urbanization resulting from migration increases inequality in the early stages of industrialization. In addition, the emergence of industrialization increases the per capita income gap between urban and rural populations until the benefits of industrialization are also shared with rural people.

2.1.2 Lewis's two-sector model (1954)

In the article "Economic development with unlimited supplies of labor," published by Lewis in 1954, the "two-sector model" in developing countries was proposed. Lewis (1954) explains labor mobility through a two-sector model in developing countries, with the traditional agricultural sector in the countryside (low productivity and labor surplus) and the modern production sector in urban areas (high productivity and labor shortage). The movement of labor from rural to urban areas is necessary for economic growth and development. Migrants to the modern sector are more productive and earn a higher salary. On the other hand, migration reduces labor in rural areas, increasing productivity and wages in this area.

Lewis assumed that surplus labor was not limited to the traditional rural sector; that is, an elastic labor supply exists in the agricultural sector. To some extent, that is a correct assumption for Vietnam, given that the population is relatively large relative to resources and capital. In 1999, 76.3% of the population lived in rural areas, and this proportion decreased to 65.6% in 2019 (Population Census Report of the General Statistics Office, 2019). Therefore, much redundant labor exists in the agricultural sector in Vietnam. Furthermore, workers in this sector are assumed to be paid at their average product level (total output divided by total labor input). If the labor force is abundant

while capital is limited, the marginal productivity of labor in the rural economy will fall to zero. To be more specific, although one more unit of labor is employed, the total output will remain unchanged. Therefore, the average labor productivity in rural areas tends to decrease gradually. Under such circumstances, when there is more capital in urban areas, workers from rural areas will move to urban areas to get wages equivalent to the average productivity in the traditional agricultural sector. Lewis (1954) argued that wages in traditional rural areas are 30% lower than in modern urban areas. The movement of labor ceases when wages are equal in both areas.

Although the model proposed by Lewis describes the process of economic growth simply and clearly, it also has three disadvantages. First, this model is based on the free movement of labor from rural areas to urban areas. However, there may be some constraints, such as regulations on the flow of labor from developing countries' agricultural or industrial sectors. These regulations aim to limit migration from rural areas to big cities, reducing pressure on their infrastructure systems and social security policies. Second, the model of Lewis (1954) only emphasizes the accumulation and concentration processes of the modern sector and ignores the development of the traditional agricultural sector itself. Finally, Lewis (1954) assumed that surplus labor exists only in rural areas and that there is no unemployment problem in urban areas. Since then, with the competitive labor market in urban areas, the actual urban wage rate has been unchanged. However, this is not the case in most developing countries, where there is still a significant increase in urban worker wages in both absolute and relative income compared to the rural average income.

2.1.3 Todaro's Migration Model (1969)

Over the next few decades, increasing unemployment and underemployment rates in urban areas challenged the accuracy of Lewis's (1954) two-sector model. To explain the urbanization process by which workers move from rural areas to cities, where unemployment may exist, Todara (1969) and Harris & Todaro (1970) proposed a model of expected income. The authors suggest that people will consider migrating when their expected income (perhaps over a long period) in urban areas is higher than their expected income in rural areas. In this study, the authors argue that rural-to-urban migration is determined by the expected urban income, which includes two variables, the real wage gap, and the probability of having a job. Workers will first compare the average rural income with the expected urban income and migrate if the former is lower than the latter. Despite the rising urban unemployment rate, many rural people still migrate because they expect that better education and skills acquired in urban areas can enable them to achieve the expected income to cover their living costs. Therefore, according to Todaro (1969), a migration rate that exceeds the employment growth rate for labor can happen. This helps explain why urban unemployment is high in most underdeveloped countries.

In this model, Harris & Todaro (1970) also mentioned the informal sector. Although there may be unemployment in urban areas, migrants cannot get jobs in the formal sector, but they can still find jobs in the informal sector with higher incomes compared to those in the countryside.

It can be seen that the above theories have provided some implications for the effect of urbanization on income inequality, as follows:

Firstly, because wage disparities cause labor migration, migration from low-wage areas to high-wage areas may increase the income of migrants. If the migrants are low-skilled workers, then it can have an impact on reducing income inequality.

Second, differences in the human capital of migrant workers can have different effects on income inequality. Migrant workers with a high level of education and skills (high human capital) will move to a place where there is a high return on human capital

(this may differ from the general salary level). The movement of this group of workers causes the human capital in the departure area to decrease. It affects the productivity of these areas, and the scarcity of skills increases, which can negatively impact income inequality.

Third, the labor market is the primary mechanism leading to the flow of labor from the countryside to the city. From there, urbanization affects other socio-economic problems, including income inequality.

2.2. Literature Review

Based on the conclusions from the studies, the authors can divide them into four groups of empirical research on the relationship between urbanization and income inequality: (1) Urbanization has the impact of reducing income inequality; (2) Urbanization has the impact of increasing income inequality; and (3) Urbanization has a nonlinear relationship with income inequality.

2.2.1 Urbanization has the effect of reducing the income inequality.

Lu & Chen (2006) used panel data for the period 1987-2001 in China and concluded that increasing urbanization can significantly narrow income inequality between urban and rural areas. Nong & Luo (2010) used household survey data in Hubei province (China) in 2002 and the Probit model to examine the impact of labor mobility from rural to urban areas on poverty and inequality in rural areas. Research shows that migration plays a vital role in transforming rural household income structures. The empirical results show that household income per capita would be 19.3% lower without migration, while the Gini coefficient would be 18.5% higher. Contrary to many studies, this study implies that migration improves household income and reduces inequality in rural areas.

Urbanization can increase income in rural areas through deposits. Urban settlers can transfer money to their relatives back home, which can generate additional income for rural residents (Lall & Selod, 2006). Deposits also create additional economic activities in rural areas, as new urban settlers spend their earnings on investments such as local real estate. In addition, many studies show that remittances increase educational attainment and improve the health of families (Becker, 2007). Improved human capital can also make a positive contribution to rural labor productivity, helping to reduce income inequality.

Based on panel data for China, Cao (2010) also found that income inequality will gradually decrease during urbanization. However, it has noticeable regional differences. B.-L. Chen (2003) suggested that accelerated urbanization can expand the demand for jobs in urban areas. As a result, more workers from traditional rural areas can move to modern urban areas, and income inequality decreases.

2.2.2 Urbanization has the effect of increasing the income inequality

Kanbur & Zhuang (2013) studied the impact of urbanization on inequality in Asia. Based on the Kuznets model (1955) and the Theil inequality measure, this study examines four countries, including China, India, Indonesia, and the Philippines. The results are as follows: Firstly, the impact of urbanization and economic structure changes on income inequality depends on each specific country. Urbanization contributes about 300% to the increase in inequality in the Philippines, more than 50% in Indonesia, and almost 15% in India. However, it reduces inequality in China. Meanwhile, the shift in urban-rural income disparity reduces inequality in Indonesia and the Philippines but increases inequality in India and China. Second, how urbanization will affect future inequality depends on the urbanization status of the country. When it crossed the "turning point,"

urbanization reduced inequality in China. In contrast, this increases inequality in India, Indonesia, and the Philippines. Third, the factors driving inequality in Asian countries include the degree of urbanization, urban-rural income disparity, and urban and rural inequality. Among them, income disparity between urban and rural areas is believed to have the most marginal impact on inequality.

Oyvat (2016) studied the impact of agricultural structure and urbanization on income inequality. The author has studied the empirical relationship between inequality in land holdings, urbanization, and income inequality using cross-sectional datasets. The estimated results indicate that inequality in land holdings has a significant impact on urbanization and income inequality in urban areas. Research also shows that excessive urbanization increases income inequality. Research results show that policymakers need to have a broader view of the importance of agricultural policies.

2.2.3 Urbanization has a nonlinear relationship with income inequality.

Maket et al. (2023) study on a group of African and sub-Saharan countries during 2000-2020 reveals that while income inequality initially increases with urban agglomeration, it eventually decreases in later stages of urbanization. The inverted U-shaped relationship between urbanization and inequality, according to Kuznets' hypothesis, was also found in a number of previous studies (Adams & Klobodu, 2019; Castells-Quintana et al., 2015; Sulemana et al., 2019).

Ali et al. (2022) used MMQR to study the impact of urbanization and industrialization on income inequality in low-, middle-, and high-income countries from 1990 to 2014. Urbanization increases inequality from the third percentile in high-income countries, and in upper-middle-income countries, it leads to a significant increase in inequality in the higher quantiles. However, it reduces inequality across all quantiles in lower-middle-income countries. An inverted U-shaped relationship was found in upper-middle- and lower-middle-income countries.

Z. Chen & Zhou (2005) found an inverted U-curve between economic development and income inequality in China. Wu & Rao (2017) studied inequality in China, focusing on identifying the leading causes of inequality. The study's main objective is to examine the relationship between urbanization and income inequality using provincial data. Panel data for 20 provinces were collected from the China Statistical Yearbook for five years, including 1998, 2000, 2002, 2005, and 2010. Empirical analysis based on OLS, fixed effects models (FEM), and random effects models (REM) shows a clear inverted U of the relationship between inequality and urbanization.

Sagala et al. (2014) studied the relationship between inequality in expenditure and urbanization in Indonesia. Panel data regression analysis was performed to test the Kuznets inverted U-shaped hypothesis based on a dataset of 33 provinces for the period 2000-2009. The study's results support the inverted U-shaped hypothesis, regardless of whether the Gini coefficient or Theil index is used as a measure of inequality. Inequality in spending is expected to peak at an urbanization rate of about 46–50%. Since the urbanization rate in Indonesia in 2010 was 50%, this shows that the inequality in expenditure has reached its highest value. Thus, further urbanization will reduce inequality in expenditure, with other factors being equal.

In Vietnam, research on the impact of urbanization on income inequality is very limited. So far, only the study of Ha et al. (2019) has examined Kuznets' inverted U-shaped hypothesis to examine the non-linear relationship between urbanization and income inequality. However, research has shown that in the long run, urbanization has the effect of reducing income inequality, while in the short term, urbanization has a negative impact on income inequality.

3. Urbanization and Income Inequality in Vietnam: An Overview

3.1 Urbanization in Vietnam

Urbanization and urban development are inevitable trends in all countries in the world, especially in developing countries like Vietnam. Urbanization in Vietnam today also has some outstanding features. Firstly, urbanization is always associated with the process of industrialization. On the one hand, industrialization is a premise for the formation of urbanization when the number and scale of production facilities increase. On the other hand, the urban system is formed along with the formation and development of material, technical, and infrastructure facilities, promoting the process of industrialization, expansion, and the new formation of industrial zones. In 2011, our country had 260 industrial zones with a total area of 72 thousand hectares, increasing to 335 industrial zones in 2020 with a total natural land area of about 97.8 thousand hectares, including 66.1 thousand hectares of industrial land area (General Statistics Office, 2022).

Secondly, urbanization occurs unevenly in regions and localities, mainly in small and medium cities. According to figure 1, in the period 2010-2020, from 772 urban areas to 862 urban areas, including two particular urban areas in Hanoi and Ho Chi Minh City, 23 grade I cities, 32 urban areas of class II, 48 grade III, 90 grade IV, and 668 grade V, mainly provincial towns or townships. In particular, from the data in Figure 1, it can be seen that the growth rate of urban areas in the period 2015-2020 is many times higher than the period 2010-2015. Specifically, the growth rate for the period 2010-2015 was only 1.9%, compared to 9.5% for the period 2015-2020.

Figure 1: The Number of Urban Areas in Vietnam in the Period 2010-2020
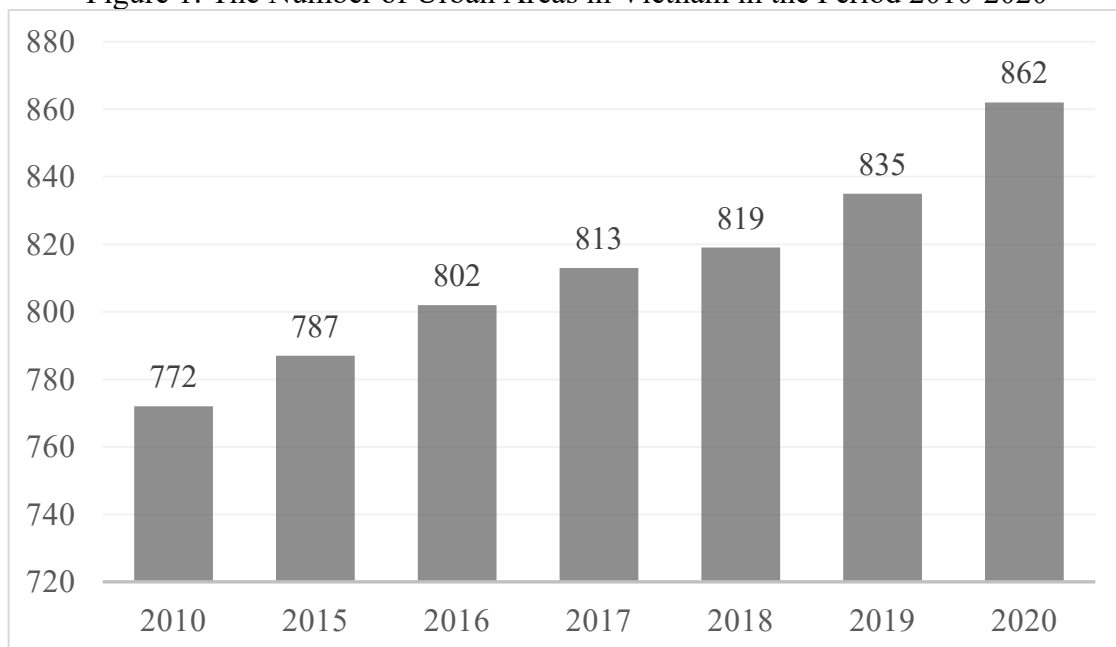
Source: General Statistics Office

The population density in big cities increases with urbanization, especially in large urban areas. In 2020, the population of our country was 97.58 million people, of which the urban population was 35.93 million people, accounting for 36.82% of the total population, an increase of 6% compared to 2010 (General Statistics Office, 2022). Urban

population increases mainly due to the impact of migration from rural areas to urban areas. According to the National Internal Migration Survey conducted in 2015 by the General Statistics Office, the main reason for migration is more job opportunities with better working conditions in urban areas. According to data published in the annual Statistical Yearbook of the General Statistics Office, the Red River Delta and the Southeast are the two regions with the highest net migration rates in the country at 3% and 18.7%, respectively, by 2020, especially some economic centers such as Hanoi (3.7%), Ho Chi Minh City (18%) and some localities with large industrial zones such as Bac Ninh (35.8%), Binh Duong (58.6%), Dong Nai (8.2%), Ba Ria – Vung Tau (3.2%).

Rapid industrialization and urbanization in a short period of time have made significant contributions to the economic development of the country. However, it also makes the gap between rich and poor take place between regions, especially in rural areas and localities with rapid urbanization.

3.2 Income Inequality in Vietnam

The Gini coefficient and IIE coefficient measures are quite commonly used to assess a country's income inequality level. The IIE coefficient is determined by comparing the difference in income per capita per month between the highest income group and the lowest income group at current prices. Each measure can reflect income inequality from different angles. Through the Gini coefficient of Vietnam in 2010-2020, we can see how income inequality changes.

Figure 2. The GINI Coefficient of Vietnam in the Period of 2010-2020
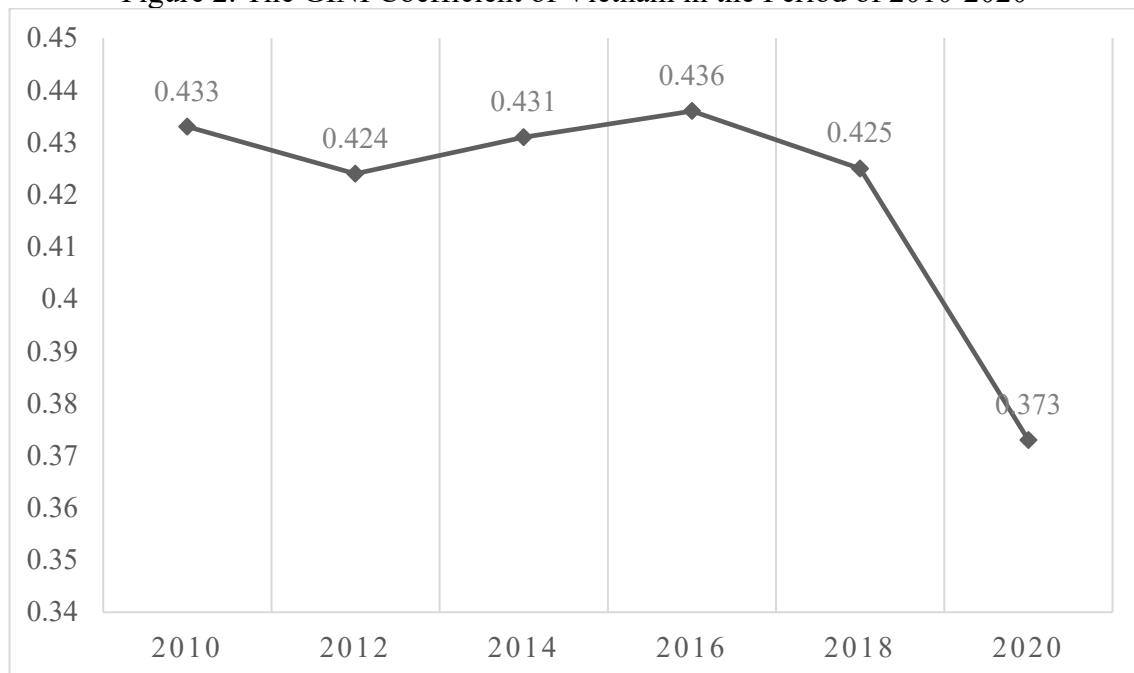
Source: Publication "National Statistical Yearbook" - General Statistics Office for the period 2010-2020

The GINI coefficient for the period of 2010-2020 shows that income inequality in Vietnam does not fluctuate much (Figure 2). This figure decreased gradually from 0.433 in 2010 to 0.424 in 2012, increased again and reached the highest value of 0.436 in 2016, and then decreased to 0.373 in 2020. According to (Cornia & Court, 2001), the Gini coefficient is in the range of 0.30 - 0.45, which is the safe and effective threshold. With this threshold, the level of income inequality is acceptable in exchange for high

economic growth. Therefore, based on the Gini data, it can be confirmed that the income inequality in Vietnam is still in the safe zone. Note that the value of the Gini coefficient for each source of income is much larger than the value of the Gini coefficient for total income (Tuyen, 2019). This is because some households only earn income from a few sources and thus will have little or no income from other sources.

Income inequality is also reflected in the income gap between income groups, especially the poorest group (group 1) and the wealthiest group (group 5). According to Table 1, in the period 2010-2020, the incomes of all population groups increased, and the income gap between groups 1 and 5 increased from 9.2 times in 2010 to 10.2 times in 2019. In 2020, due to the impact of the epidemic, which has significantly affected the income of employees, the amount of food. Due to the impact of several policies to support the poor, this number was reduced to 8.1 times. Income inequality looks more clearly from the perspective of the difference in absolute value between income groups. Specifically, in 2010, the difference between the lowest income group (group 1) and the highest income group (group 5) was 3 million VND. In 2019, this difference tripled in 2010, and in 2020, this difference will decrease, but the gap is still significant at nearly 8.1 million VND.

Table 1: Per Capita Income per Month in the Period 2010-2020

Unit: Thousand VND

Year	Average	Group 1	Group 2	Group 3	Group 4	Group 5	a	b (times)
2010	1387	369	669	1000	1490	3410	3041	9,2
2012	2000	512	984	1500	2222	4784	4272	9,3
2014	2637	660	1314	1972	2830	6413	5753	9,7
2016	3098	771	1516	2301	3356	7547	6776	9,8
2018	3876	932	1907	2934	4291	9320	8388	10,0
2019	4295	988	2100	3330	4954	10103	9115	10,2
2020	4249	1139	2491	3528	4896	9193	8053	8,1

Note: a.Gap (Absolute difference) in income between group 1 and group 5
b: Number of times difference in income between group 1 and group 5
Source: Publication "National Statistical Yearbook" - General Statistics Office for the period 2010-2020

4. Econometric Analysis

4.1. Empirical Model

As discussed in the previous sections, urbanization can theoretically improve or worsen income inequality in host countries. Based on the migration model of Todaro (1969) and previous empirical studies, the model to estimate the impact of urbanization on income inequality in Vietnam has the following form:

$$IIE_{it} = \beta_0 + \beta_1.UR_{i,t} + \beta_j.X_{i,t} + \mu_i + \varepsilon_{it} \qquad (1)$$

In this model:

μ_i is a fixed effect that does not change over time. The IIE coefficient is determined by comparing the difference in income per capita per month between the highest income group and the lowest income group at current prices. μ_i represents the specificity of each locality, and ε_it is an unobserved random component.

The variable representing income inequality is the IIE coefficient. The higher this coefficient, the greater the income inequality, or the deeper the gap between rich and poor.

The variable representing urbanization is the variable UR. This variable is measured by the volatility of the urban population. The indicator of the urban population ratio reflects the degree of urbanization in each locality. The urban population ratio is the percentage of the population living in urban areas relative to the total population.

X is the set of other explanatory variables. According to the theory of urbanization and income inequality, six essential control variables are given in the equation: trade openness, level of economic development, human capital, unemployment rate, inflation, and foreign direct investment capital.

The first control variable is trade openness – denoted as Trade. According to Francois & Nelson (2003) and Heckscher & Ohlin (1991), increased international trade in countries with a majority of unskilled workers will reduce poverty. On the other hand, Feenstra & Hanson (2001) argue that income inequality will increase in countries where skilled labor predominates. In this study, the variable Trade is the percentage of total trade (both imports and exports) to GDP of province i year t, reflecting   trade openness from a macro perspective (% of total export + import turnover /GDP).

Regarding the level of economic development, the previous work by Tsai (1995) and Figini & Görg (2011) suggested using the criterion of GDP per capita. This variable is the most common proxy for economic development and growth. Economic growth leads to an increase in a country's GDP if everyone can benefit equally. On the other hand, economic growth can lead to income inequality if labor can absorb benefits from economic growth and better policies related to income distribution. The variable PGDP is the GDP per capita of province i in year t at fixed prices in 2010 (units of millions of VND/person) to see which way growth and economic level are related to income inequality.

Human capital was introduced as a third control variable. This variable is included to control for the supply side of the labor market because of changes in the supply and demand of skilled labor. In other words, education is seen as an investment in human capital that increases workers' skills. Thus, a more developed level of education has the potential to reduce income inequality. In contrast, Lin et al. (2013) suggest that countries with higher levels of human capital may experience positive economic growth and, therefore, greater income inequality. The variable HC represents the level of human capital, represented by the proportion of trained workers in the province i year t.

As a fourth control variable, general unemployment levels are included in the data because they can profoundly impact income inequality due to the negotiating power of wages (Te Velde, 2003). Furthermore, unemployment models are closely linked with economic development and liberalization processes and thus affect income distribution. Saunders (2002) points to evidence that unemployment increases the risk of poverty, contributes to income inequality, and leads to a range of social effects that weaken the unemployed, their families, and the community. In this study, the variable UNEM represents the unemployment rate aged 15 and over of the population of province i year t.

The fifth control variable used in the model is inflation. Studies by Erosa & Ventura (2002), Crowe (2004), and Albanesi (2007) all show that inflation increases income inequality. The common explanation of these studies is that inflation increases money income, leading to a redistribution of income among individuals in society in favor of the rich. High inflation has a greater impact on the poor because their assets and actual income at constant prices will be reduced. As a result, high inflation often widens the income gap. Meanwhile, some studies show a negative effect of inflation on income

inequality or find no effect (Yue & Shatin, 2011). The inflation variable is measured by the consumer price index (CPI) of province i year t.

The final control variable in the model is foreign direct investment (FDI). One of the most important contributions of FDI is to create more jobs for workers in the host country (Jensen & Rosas, 2007). In many developing countries, underemployment is caused by a lack of investment (both domestic and foreign investment). Low investment also makes the job search difficult when the economic growth rate is lower than the population growth rate. By creating jobs for workers, FDI can also increase or decrease income inequality. While creating jobs and income for unskilled workers can reduce income inequality, increasing demand for skilled workers can increase income inequality. The variable FDI is the ratio of realized FDI to current GDP in province i year t to consider the effect of FDI in province i year t.

The authors also made estimates to consider the possibility of the existence of an inverse U-shaped nonlinear relationship according to the theory of Kuznets (1955); model (1) is then added with the squared variable of the UR variable, denoted 〚UR〛^2

$$IIE_{it} = \beta_0 + \beta_1.UR_{i,t} + \beta_2.UR_{i,t}^2 + \beta_j.X_{i,t} + \mu_i + \varepsilon_{it} \qquad (2)$$

In addition to estimating the impact of urbanization on income inequality, the study continues to test the impact of urbanization on income inequality under the influence of local human capital and education levels. One of the reasons income inequality occurs is due to changes in the demand for skilled or unskilled labor. Thus, one could argue that income inequality arises because there is no equal change in the supply and demand for skilled or unskilled labor. In other words, income inequality increases as the demand for skills increases, leading to a higher demand for skilled labor. When the subjects are individuals with educational qualifications based on their own ability, demographic characteristics such as family, gender, place of residence, ethnicity, number of brothers in the family, and other characteristics that are not related to the occurrence of urbanization. Education is the moderating/binding factor for the relationship between urbanization and income inequality. To examine how the impact of urbanization on income inequality changes as education levels change, the author adds the interaction variable between urbanization and human capital (UR × Human capital) to model figure number (1).

$$IIE_{it} = \beta_0 + \beta_1.UR_{i,t} + \beta_2.UR_{i,t} \ x \ HC_{i,t} + \beta_j.X_{i,t} + \varepsilon_{it} \qquad (3)$$

In models (2) and (3), in addition to the variable 〚UR〛^2 and the interaction variable, other variables in the model are used similarly to model (1).

4.2 Data

This study uses provincial-level panel data containing 63 provinces from 2010–2018 in Vietnam. All the data in this study were collected from the General Statistics Office of Vietnam. Since the main objective of this paper is to investigate the impact of urbanization on income inequality in Vietnam, the dependent variable used in this study is the IIE coefficient, which is the difference between the highest income quintile and the lowest income quintile on the monthly average income per capita at current prices by province. As mentioned above, the sign of the variable of urbanization (UR) could be either positive (increasing income inequality) or negative (reducing income inequality), subject to an empirical investigation.

5. Regression Results and Explanations

To select the appropriate model, the study used Breusch and Pagan Lagrangian and Hausman tests. The test results show that the fixed effects model is appropriate. The study applies the fixed-effects regression estimation method with the standard error of Driscoll & Kraay (1998) to overcome the phenomenon of autocorrelation, cross-correlation, and variable variance to ensure an accurate, stable, and effective estimation.

Table 2: Regression Results

Model	Model 1	Model 2	Model 3
Variables	IIE	IIE	IIE
UR	0.0033*	0.0312**	0.0115***
	(0.002)	(0.015)	(0.002)
URsq	-	-0.0003**	-
	-	(0.000)	-
lnPGDP	5.4586***	5.8672***	1.2664***
	(0.571)	(0.440)	(0.091)
TRADE	0.0001**	0.0001***	0.0001***
	(0.000)	(0.000)	(0.000)
HC	-0.0052*	-0.0059**	-0.0201***
	(0.003)	(0.003)	(0.003)
UNEM	0.0027	0.0063	0.0103
	(0.020)	(0.018)	(0.015)
CPI	0.0193**	0.0196**	0.0139*
	(0.008)	(0.008)	(0.008)
FDI	0.0039***	0.0040***	0.0013
	(0.001)	(0.001)	(0.001)
URxHC	-	-	-0.0007***
	-	-	(0.000)
Constant	6.0886***	6.2979***	0.4405
	(0.604)	(0.535)	(1.048)
Observations	315	315	315
Number of groups	63	63	63
Driscoll and Kraay's standard errors are reported in parentheses			

Note: *** p<0,01, ** p<0,05, * p<0,1
Source: Authors' calculations from Stata 16.

Column 1 in Table 2 shows the estimated results of Model 1 – The model that tests the linear impact of urbanization on income inequality. The estimation of a fixed-effects panel (FE) regression model with the standard error by Driscoll & Kraay (1998) shows that urbanization has a negative impact on income inequality. This means that urbanization has contributed to increasing income inequality in Vietnam. Column 2 is model (2), with the variable URsq (squared of UR) being significant at a 5% level and having the sign (-). This implies that a nonlinear relationship exists between urbanization and income inequality in an inverted U shape, as predicted by Kuznets (1995). Thus, the experimental results conclude that from 2010-2018, the urbanization process led to an increase in income inequality, but at a decreasing rate over time. This result is different from the study of Ha et al. (2019), where the authors argue that urbanization reduces income inequality in Vietnam.

The positive effect of urbanization on income inequality can be explained by the following reasons. Firstly, urbanization causes production in the countryside to stagnate as labor moves to the city. Urban areas are under pressure from unemployment, overload for infrastructure, pollution of the living environment, unsecured social security, and social evils. Employment is uncertain, and most jobs are in the informal sector. Second, the loss of livelihood for people who mainly work in agriculture when their qualifications cannot meet the needs of working in industrial zones creates a large income gap between high-income people and low-income groups. Third, due to limitations in the regulations, most migrants do not have permanent residence registration in the urban area. Hence, they have to work in the informal sector with low wages, and it is not easy to access social security, health care, and education. Fourth, urbanization is taking place unevenly, mainly through the formation of small cities. When these cities are not managed effectively, the benefits of urbanization may not be realized in terms of increasing productivity and living standards. Fifth, the rapid urbanization of land and lack of planning lead to unreasonable use of the land fund and the rapid reduction of agricultural land area, affecting jobs and the income of agricultural workers. Sixth, besides the impact of the process of industrialization - modernization, the proportion of the urban population in the provinces in recent years has fluctuated enormously. Urban poverty is widespread in Vietnam's small towns and cities, leading to increased income inequality. Last but not least, another reason that urbanization is positively related to income inequality may be that urban poverty is related to rural-urban migration flows in big cities. Cameron (2012) points out that poor urban households that are rural-urban migrants have fewer assets and live in worse housing conditions in areas with fewer public schools. There is less social connection in the area where they live. The adults in these households have lower levels of education than urban indigenous households. Viet et al. (2013) found that newcomers to urban areas are more likely to fall into poverty, while those who have been migrating for a long time are often not poor.

In addition to the main result, as just presented, it can also be shown that the level of trained labor can effectively reduce income inequality. Theoretically and empirically, an economy with high human capital and good population quality should help reduce income inequality. This result is consistent with previous studies on the effect of human capital on income inequality by Basu & Guariglia (2007) and Figini & Görg (2011).

The economic growth variable (lnPGDP) is significant at the 1% level with the coefficient sign (+). Thus, economic growth in Vietnam leads to an increase in income inequality. This can be explained by the fact that the economic growth of a country can lead to severe income inequality if everyone cannot benefit from the economic development equally.

The estimation results show that the variable FDI has a positive impact on income inequality and is statistically significant at the 1 percent level. This means that FDI increases income inequality in Vietnam. The fact that FDI initially increases income inequality in Vietnam can be explained for the following reasons. First, according to the Vietnam Enterprise Survey data, the average salary of FDI firms is higher than that of domestic firms. During 2012–2018, the rate of the FDI business sector's wages per domestic corporate wage fluctuated from 1.38 times in 2012 to 1.28 times in 2018, of which the highest point was 1.61 times in 2014. Second, an analysis of the Vietnam Enterprise Survey data also shows that FDI can cause inequality between regions. When the average wages of regions that attract a large amount of FDI, including the Red River Delta and the Southeast regions, are also significantly higher than the rest of the regions. Thus, a comparative analysis of wages in FDI and domestic firms also shows that foreign direct investment in Vietnam tends to increase income inequality. This phenomenon is not only limited to the local scope but also manifests clearly among economic regions.

The variable inflation, as measured by the consumer price index (CPI), is significant at the 5% level with the sign of a positive coefficient. Inflation impacts the poor more because their real assets and income (at a constant price) are dramatically reduced. As a result, high inflation often increases the income gap. This study confirms that rising inflation leads to an increase in poverty and widens the income inequality gap.

The negative impact of international trade on income inequality is also clearly shown in the research results. Based on the specific factors of an international trade model, it can be concluded that trade liberalization will force countries to focus on the production in which they have a comparative advantage. As a result, trade liberalization will benefit the exporting sector and hamper the importing sector. Since Vietnam has a strong comparative advantage in labor-intensive manufacturing industries and a comparative disadvantage in agricultural production, manufacturing will be influenced positively by trade liberalization, while the impact on agriculture is negative. Consequently, trade liberalization will tend to widen income disparities.

The impact of the unemployment variable is not yet confirmed, and more studies are needed to confirm the direction of the impact.

Column 3 in Table 2 shows the estimation results of model 3 – The model that tests the impact of urbanization on income inequality under the regulatory influence of human capital. The variable of interest in the model (3) is the interaction variable UR x HC which is significant at the 1% level and the sign of the coefficient (-). The results show that urbanization has a positive impact on income inequality under the influence of human capital and education level.

6. Conclusion

The main objective of the paper is to investigate the relationship between inequality and urbanization. This study analyzed and assessed the impact of urbanization on income inequality in Vietnam over the period 2010-2018. The study provides the following main findings. First, the study finds that while urbanization has directly contributed to increasing income inequality, urbanization has also contributed to reducing income inequality with the moderating effect of provinces' levels of education. Second, a non-linear relationship between urbanization and income inequality is also confirmed, which suggests that the expansion of urbanization leads to an increase in income inequality, but at a decreasing rate over time. Third, the negative effect of economic development on income inequality is validated, which implies that income inequality in Vietnam will gradually increase as Vietnam's economy continues to grow and per capita income keeps rising. Fourth, the development of human capital has a significant effect on reducing income inequality, which implies that improving the overall quality of human resources will benefit everyone and improve income equality. Fifth, trade liberalization will tend to widen income inequality in Vietnam. Sixth, rising inflation leads to an increase in the income inequality gap. Finally, foreign direct investment in Vietnam tends to increase income inequality.

For a developing country like Vietnam, ensuring social justice in general and reducing income inequality in particular plays a vital role in stabilizing society toward sustainable development. Urbanization has made significant contributions to economic development. However, the rapid urbanization process also entails limitations that have a negative impact on a number of social issues. The study has some policy implications. First, the local authorities need comprehensive and timely solutions to meet the urbanization process, ensuring economic growth and maintaining stability and social justice. Second, Vietnam's government should investigate the social components of

urbanization and create public policies that fulfill the needs of their citizens as their economies modernize (G. Chen et al., 2016). Third, when low-skilled workers migrate to metropolitan towns, they must start and pursue vigorous industrialization to absorb them (Wu & Rao, 2017). Public policy might focus on ensuring that rural communities have access to educational opportunities, health care, and other social amenities because the majority of rural migrants to urban areas work in the informal sector. Last, the results show that urbanization has a positive impact on income inequality under the influence of human capital. However, the provision of adequate education and training of high quality has not been successful in Vietnam. Therefore, policymakers should prioritize boosting spending on public education and enhancing human capital, such as by providing a solid educational foundation (at least secondary education) and proper technical education, which can lessen income inequality.

Acknowledgements

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