I Z A Institute
of Labor Economics
Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 15916

Rapid Economic Growth but Rising Poverty Segregation: Will Vietnam Meet the SDGs for Equitable Development?

Hai-Anh H. Dang
Shatakshee Dhongde
Minh Do
Cuong Viet Nguyen
Obert Pimhidzai

FEBRUARY 2023

I Z A Institute
of Labor Economics

Initiated by Deutsche Post Foundation

DISCUSSION PAPER SERIES

IZA DP No. 15916

Rapid Economic Growth but Rising Poverty Segregation: Will Vietnam Meet the SDGs for Equitable Development?

Hai-Anh H. Dang
World Bank, IZA, Indiana University and Vietnam National University

Shatakshee Dhongde
Georgia Institute of Technology

Minh Do
Vietnam National University

Cuong Viet Nguyen
Vietnam National University and Mekong Development Research Institute

Obert Pimhidzai
World Bank

FEBRUARY 2023

ISSN: 2365-9793

IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

Rapid Economic Growth but Rising Poverty Segregation: Will Vietnam Meet the SDGs for Equitable Development?*

Vietnam is widely regarded as a success story for its impressive economic growth and poverty reduction in the last few decades. Yet, recent evidence indicates that the country's economic growth has not been uniform. Compiling and analyzing new extensive province-level data from the Vietnam Household Living Standards Surveys (VHLSSs) for every alternate year between 2002 and 2020 and other data sources, we find within-province inequality to be much larger than between-province inequality. Furthermore, this inequality gap is rising over time. Despite the country's fast poverty reduction, the poor were increasingly segregated in certain provinces. We find beneficial impact of economic growth on poverty reduction, but this can depend on inequality levels. We also find greater inequality to have negative impact on economic growth and poverty reduction. Our results suggest that policy makers in Vietnam should focus on reducing spatial disparities and income inequality in order to attain sustainable economic development.

JEL Classification: C15, D31, I31, O10, O57

Keywords: poverty, inequality, pro-poor growth, convergence, household surveys, Vietnam

Corresponding author:
Hai-Anh H. Dang
World Bank
1818 H Street
N.W. Washington DC 20433
USA
E-mail: hdang@worldbank.org

* We would like to thank Sanghamitra Bandyopadhyay, Andy McKay, and participants at Review of Development Economics "Inequality in the 21st century: Symposium" workshop and University of Michigan's Sustainability and Development Conference (Ann Arbor) for useful comments on an earlier draft. We are grateful to the UK Foreign Commonwealth and Development Office (FCDO) for funding assistance through the Data and Evidence for Tackling Extreme Poverty (DEEP) Research Program.

1. Introduction

Poverty and inequality provide two closely related, but different, measures of household welfare. As rising global living standards have led to less poverty, increasingly more attention has been placed on whether the fruits of economic growth are equally distributed to different population groups in a society. The Sustainable Development Goals (SDGs) adopted by the United Nations (UN) offer a most notable example where both the need to reduce poverty (SDG number 1) and inequality (SDG number 10) are emphasized by the international community. Indeed, a country with good economic growth but a (highly) unequal income distribution may neither be able to shrink its poor nor narrow the undesirable gaps between its population segments.

Vietnam is widely regarded as a success story for its impressive economic growth and poverty reduction in the last few decades. In particular, its growth has been found to be pro-poor (Glewwe and Dang, 2011; Nguyen and Pham, 2018; Pimhidzai and Niu, 2021). Yet, recent evidence indicates that the country's economic growth was not uniform: while inequality gaps between urban and rural areas have been found to narrow over time, they have widened within urban and rural areas (Bui and Imai, 2019).[1] Furthermore, poverty rates became concentrated spatially (Lanjouw, Marra, and Nguyen, 2017) and among ethnic minority groups (Benjamin, Brandt, and McCaig, 2017), suggesting that attention can be focused on these particular groups for more effective poverty amelioration.

In this paper, we aim to provide a long-term (and mostly descriptive) review of poverty and inequality trends in Vietnam in the past two decades. We contribute to the existing literature in

[1] Analyzing earlier VHLSS data covering the early 1990s to the early 2000s, Le and Booth (2014) and Nguyen *et al.* (2007) found widening urban-rural gaps in inequality. For recent studies on the ethnic gaps in living standards, see Dang (2012) and Fujii (2018).

several ways. First, we offer a broad but early assessment of the intertwined relationship between poverty, inequality, and economic growth for the country. In particular, we investigate several research questions that are highly relevant to policy. Have average incomes across provinces converged (or diverged) over time? If yes, how were the poor segregated? Why were the poor spatially concentrated in some provinces and not others? Did factors such as inequality, urbanization, investment, and volume of government spending play a role? Furthermore, what could we tell about the relationship between economic growth, inequality, and poverty? That is, given the same level of poverty, could inequality have hindered the speed of economic growth?

Second, our analysis spans the period 2002-2020, which represents the longest-running period for the country that has been examined in an academic study. We could complete this task by analyzing 10 rounds of the nationally representative Vietnam Household Living Standards Surveys (VHLSS). Finally, we construct a database of panel data at the province level, which allows us to offer more disaggregated analysis than the urban-rural dichotomy analyzed in previous studies. We further supplement this database with data on government spending that we collect from the central government and different provincial government websites. A useful implication is that we can zoom in on provinces that are good (or bad) performers. Furthermore, this rich panel database also allows us to employ rigorous econometric modelling techniques to investigate the channels affecting the province-level income distributions.

Our estimation results suggest that within-province inequality has steadily increased over time. Within-province inequality is also much larger than between-province inequality, with the former type of inequality being almost three times the latter type of inequality in 2020. Average incomes and expenditures appear to converge across provinces, while poverty significantly declined during this period. The remaining poor seem to be regionally segregated among provinces with a greater

share of ethnic minority population. We find beneficial impact of economic growth on poverty reduction, but higher inequality is positively correlated with poverty, and might impede economic growth. Provinces with greater population density and a larger share of urban population have faster growth, whereas the opposite result holds for those with a greater share of ethnic minority groups.

This paper consists of four sections. In the next section, we describe the data (Section 2.1), discuss the overall trends in economic growth, inequality and poverty at the country level (Section 2.2) and at the regional level as well as analyze poverty segregation across provinces (Section 2.3). We subsequently investigate in Section 3 the relationship between economic growth, inequality, and poverty, including convergence in inequality. We finally conclude in Section 4.

2. Trends in Economic Growth, Income Inequality, and Poverty

2.1. Data

We compile data from the Vietnam Household Living Standards Surveys (VHLSSs), which has been widely employed by the government, the international community, and academic researchers for poverty and inequality analysis for the country. The VHLSSs have been conducted by the General Statistics Office of Vietnam with technical support from the World Bank every two years since 2002. We compile data on all 58 province and five centrally controlled municipalities and supplement this data with other data that we collect.[2] In particular, provincial government spending data for the period 2018-2020 is currently unavailable for all the 63 provinces as a whole in any official document. In order to get the most updated data, we manually collect the state

[2] These municipalities are Can Tho, Da Nang, Hai Phong, Hanoi and Ho Chi Minh City

spending and investment spending data for 2018-2020 from several sources including the Ministry of Finance's website, provincial finance departments' websites, and relevant official documents.

The VHLSSs contain detailed data on individuals and households. Household-level data are collected on durables, assets, production, income, and participation in government's programs. Individual-level data are collected on demographics, education, employment, health, and migration. The 1999 Population and Housing Census was used as the sampling frame of the VHLSSs during 2002-2008, while the 2009 and 2019 Population and Housing Censuses were used as the sampling frame of the VHLSSs respectively for 2010-2016 and 2018-2020. Around 3,100 communes were chosen as the primary sampling units out of the list of 10,000 communes for the whole country. A village was randomly selected from each commune, and about 15 households were selected randomly from the village.

The large-sample VHLSSs have a sample size of about 46,000 households that are designed to be representative at the provincial level. While these large-sample surveys only collect income data, a sub-sample of the VHLSSs (the small-sample VHLSSs of around 9,000 households) collect data on both income and expenditure. Since policy discourse in the country is typically based on poverty and inequality analysis using expenditure data, we mostly analyze such data in this paper. In particular, we obtain the province-level expenditure using Elbers *et al.*'s (2003) small area (poverty-map) estimation method.[3] However in the Appendix we also provide some alternate estimates using per capita income, which offer qualitatively similar results.

[3] Generating the small-area province-level expenditure data consists of two step. First, we estimate an expenditure model using the small-sample VHLSs. The dependent variable is the per capita expenditure, and the explanatory variables consist of household characteristics such as demographics, education, durables, and housing conditions. Second, we apply this expenditure model to the large-sample VHLSSs (using the same variables that were employed in the expenditure model based on the small-sample VHLSSs) and predict per capita expenditure for all the households. See Dang and Lanjouw (forthcoming) for a recent overview of related poverty imputation methods.

2.2. Overall trends in economic growth, inequality and poverty

We provide in Table 1 the country trends in (real) per capita income, expenditure, poverty and inequality. Between 2002 and 2020, per capita incomes increased significantly from 4,565 thousand (Vietnamese) dong to 15,156 thousand dong.[4] Similarly, real per capita expenditure more than tripled from 3,476 thousand dong in 2002 to 14,251 thousand dong in 2020.[5] This rapid economic growth has been widely attributed to important policy changes that took place in Vietnam in the last two decades (see, e.g., Justino and Litchfield, 2014, Benjamin *et al.*, 2017 for a review). Specifically, the "*Doi Moi*" (renovation) policies introduced in 1986 helped transform Vietnam from a centrally planned economy to an open, export-oriented economy with high volume of trade and foreign direct investment. In 2001, the U.S. and Vietnam signed a Bilateral Trade Agreement, in which the U.S. granted Vietnam the status of the Most Favored Nations. As a result, tariffs on Vietnamese exports to the U.S. reduced significantly, triggering export-led economic growth.

Figure 1 plots the distribution of log of per capita expenditure over time. Between 2004 and 2020, the distribution shifted significantly to the right, indicating a rise in average per capita expenditures.[6] However there is not a marked decrease in the variance of the distribution, indicating that inequality did not change rapidly during this period. We estimate three different measures of inequality, namely the Gini index and the Theil L and T indices and show the results

[4] On average, slightly more than 18,000 Vietnamese dong equals one US dollar in this period (World Bank, 2018a).
[5] There is a large difference in income and expenditure values between the 2008 and the 2010 VHLSS (Table 1). This difference is mainly because of a change in the recall period in the questionnaires. From 2002 to 2008, the survey asked for household expenditure or income in the past 12 months. However from 2010 onward, these values were asked for the past month and then multiplied by 12 to estimate annual values. As a result there is a break in values in per capita expenditure between values before 2010 and those since 2010. We have not made any adjustment to our data following a change in the recall period; for more related discussion on this topic, see Deaton and Kozel (2005).
[6] The distribution for 2010 (not shown, to make Figure 1 less cluttered) also shifts to the right of that of 2008, which further supports the increase in living standards over time. This also helps lessen potential concerns about comparability issues with the changes in the questionnaires as discussed above.

in Table 1. All the three measures show steady levels of inequality in per capita expenditure. The average value of the Gini index was 0.37 and close to the lower side of the typical range of 0.3-0.5 for Gini values for per capita expenditures in developing countries (World Bank, 2005).

The Gini index is derived from the Lorenz curve and cannot be written as the sum of a term summarizing within-group inequality and a term summarizing between-group inequality (Bourguignon, 1979). Unlike the Gini index, the Theil index is a generalized entropy (GE) measure and it can be decomposed into within and between components. Table 2 shows the decomposition of the Theil L index (GE 0; also known as the mean log deviation) and the Theil T index (GE 1). We find that within-province inequality increased over time. Within-province inequality explained about 66% of total inequality in 2002, but more than 70% in 2020. This translates into within-province inequality increasing from about twice higher than between-province inequality in the early 2000s, to about three times higher than between-province inequality in the late 2010s. Thus, within-province inequality has become much more significant over time than between-province inequality.[7]

There were significant differences in inequality levels within the provinces (Appendix A, Table A.1). Compared with the national average of 0.37, the Gini index was greater than 0.40 in Lao Cai, Dien Bien, and Lai Chau in the northern mountain region. In 2020, these provinces still had some of the very high poverty rates (Lao Cai: 21.5%, Dien Bien 46% and Lai Chau: 36%). Inequality and poverty levels were similarly high in the central highlands region (e.g. Kom Tum and Gia Lai had Gini values of 0.41 and 0.39 and poverty rates of 17% and 27% respectively). On the other hand, inequality was lower in Mekong river delta with a Gini index of about 0.31 in Long An and

[7] Interestingly, the world has witnessed rising within-country inequality in the past two decades as well, although within-country inequality still tends to be lower than between-country inequality (Gradin, 2021).

Tien Giang (where poverty rates hover around 1%) and 0.28 in Hung Yen and Thai Binh in the Red river delta (where poverty rates range around 1%).

Finally, we also show in Table 1 the estimates of three FGT indices of poverty (Foster *et al.*, 1984). The poverty rate (i.e., the headcount ratio) measures the incidence or the proportion of the poor in the population, the poverty gap measures the depth of poverty (i.e., the average income shortfall of the poor), whereas the poverty severity index (i.e., the squared poverty gap) takes into account inequality of the income distribution among the poor. All three measures are estimated using the national (expenditure-based) poverty line as well as the World Bank's PPP $3.1 per day poverty line.[8] In tandem with the rapid economic growth, we find that poverty rates declined significantly. Nationwide, the headcount poverty rate decreased from 29% in 2002 to less than 10% and 5% in 2016 and 2020 respectively. Notably, the first goal of the United Nations' Millennium Development Goals was to reduce extreme poverty rates by half between 1990 and 2015 but Vietnam appears to have well exceeded the target.[9]

2.3. Regional distribution of poverty

The country-level trends in economic growth, poverty and inequality do not reflect the regional variation in these indicators. In Table A.1 in the Appendix, we present the estimates for each of these indicators in 2020, for all 63 provinces. In the last two decades, although overall poverty declined rapidly in Vietnam, poverty rates varied significantly across provinces. Poverty rates were lowest in Ho Chi Minh City (1.8% average over time) and neighboring Binh Duong province

[8] The poverty and inequality estimates in Table 1 can differ from those published by the World Bank because of different data sources used.
[9] The country's performance is even more impressive if we consider that the poverty rate was 58% in 1992-1993 (World Bank, 1999).

(3.2% average). Ho Chi Minh City is the largest city and the prime economic center in Vietnam. The city has numerous export processing zones, industrial parks, colleges and universities, as well as the largest international airport in the country. After Ho Chi Minh City, Binh Duong is the second highest recipient of foreign direct investment. Both Ho Chi Minh City and Binh Duong province are in the southeast region.[10] Poverty was also lower in the Red River Delta, for instance in the capital city of Hanoi (5.4% average) and the port city of Hai Phong (5% average).[11] On the other hand, poverty rates were very high in northwest provinces of Son La (50% average), Dien Bien (62% average), Lai Chau (60% average) and Ha Giang (56% average) in the northeast. These provinces lie in the inland, mountainous regions, bordering China and Laos and have more than 80% of their population residing in rural areas. Furthermore, more than 70% of their population consist of ethnic minorities.

Given the large variance in poverty levels across provinces, there is evidence suggesting that poverty has become spatially concentrated over time (Lanjouw *et al.*, 2017). We measure disparity in the regional distribution of poverty by estimating a poverty segregation curve (Dhongde, 2017).[12] The poverty segregation curve is a highly useful graphical tool to analyze how the regional distribution of the poor changed over time. The curve compares a province's share of the poor population with its share in the overall population. The poor are segregated when provinces' share of the poor does not resemble their share in the overall population. Perfect integration (zero segregation) implies that each province has the same share in the poor and the overall population (poor and non-poor combined). Figure 2 plots the poverty segregation curve for 2002 and 2020.

[10] McCaig (2011) find that provinces that were more exposed to the U.S. tariff cuts experienced faster decreases in poverty in the early 2000s.
[11] Pham and Mukhopadhaya (2018) also found that poverty rates were lower in the regions of Southeast and Red River Delta
[12] Also see Massey (2016) for a more general discussion on the segregation curve.

The diagonal line of equality shows that there is zero segregation of the poor. The 2002 curve lies above the 2020 curve and hence dominates the 2020 curve. In other words, there was unambiguous increase in the segregation of poor in Vietnam.

Poverty segregation curves, may often intersect or overlap, and thus fail to provide a complete rank ordering of inequality. In Table 3, we calculate two indices of segregation, namely the Dissimilarity index and the Gini index. The Dissimilarity index is equal to one-half the sum of the absolute difference between the proportion of the poor and the proportion of the population across provinces. The Gini index is equal to twice the area between the segregation curve and the diagonal of equality.[13] Between 2002 and 2010, there was not a marked increase in segregation. However, since 2012, there was a steady rise in the spatial inequality in the distribution of the poor. Provinces with a cumulative share of about 50% of the total population had about 30% of the poor population in 2002, whereas only about 3% of the poor population in 2020. Over the years, poor provinces such as Dien Bien and Lai Chau saw their share of the poor population increase disproportionately. Despite a rapid decline in average poverty levels, we find that the remaining poor were increasingly segregated in certain provinces in the country.

3. Relation between Economic Growth, Inequality and Poverty

3.1. Factors affecting provincial poverty

[13] The Gini index satisfies the properties of symmetry, scale invariance, and the regressive transfer principle, and provides a consistent ranking of the distributions whenever the segregation curves do not intersect. The dissimilarity index does not satisfy the principle of regressive transfer. See Dhongde (2017) for a detailed discussion on these properties.

In order to understand the rise in the spatial segregation of the poor, we analyze the VHLSS data to find which factors were highly correlated with provincial poverty levels. We estimate the following standard model that links income and inequality to poverty

$$P_{i,t} = \alpha + \beta Log\left(Y_{i,t-1}\right) + \gamma G_{i,t-1} + \delta X'_{i,t-1} + \theta T_t + u_i + v_{i,t} \qquad (1)$$

where $P_{i,t}$ is a poverty index of province i in year t, $Y_{i,t-1}$ is the lag of per capita expenditure, $G_{i,t-1}$ is the lag of Gini index, $X_{i,t-1}$ is a vector of explanatory variables including high school completion rates, shares of the ethnic and the rural population and different types of investments, T_t is a year dummy variable. The unobserved variables are decomposed into time-variant ($v_{i,t}$) and time-invariant components (u_i).[14]

We estimate Equation (1) using both OLS (Appendix A, Table A2) and GMM estimators (Table 4). OLS estimates can be biased if the log of lagged per capita expenditure is correlated with unobserved variable (but these can serve as useful robustness checks). We address this selection bias as follows. Firstly, we also estimate the model of first-differenced variables, and the first difference transformation removes the time-invariant unobserved effect (u_i). The Arellano–Bond test for zero autocorrelation of the first-order and second-order in first-differenced errors are reported at the end of Table 4, and this test for autocorrelation presents no evidence of model misspecification. Secondly, we apply the GMM estimator which were developed by Holtz-Eakin, Newey, and Rosen (1988) and Arellano and Bond (1991). The GMM-type instruments for the log of lagged per capita expenditure are higher order lags of the per capita expenditure variables. Although the exogeneity of these instruments may be questionable, we can perform the overidentification test to test the validation of the instruments. The Sargan test of over identifying

[14] See, e.g., Ferreira (2010) for a review of related poverty and growth models.

restrictions is performed and reported at the bottom of Table 4. The null hypothesis that overidentifying restrictions are valid is not rejected in all the regressions. For comparison, we report the regression without any control variables and the regression with control variables.

Table 4 shows that, holding all other factors constant, a one-percent rise in a province's per capita expenditure reduced its poverty rate by 0.3 percentage points (column 2), its poverty gap by 0.11 percentage points (column 4), and its poverty severity index by 0.05 percentage points (column 6). [15] Importantly, holding fixed the per capita expenditure levels, a rise in (the lag of) the Gini index not only increased the incidence but also the depth and severity of poverty. The estimation results obtained by OLS (Appendix A, Table A2) are qualitatively similar. These results generally concur with findings for other countries, which suggest that economic growth can be beneficial for poverty reduction, but this relationship can change depending on inequality levels (Cerra *et al.*, 2022; Ferreira *et al.*, 2022).

For the other control variables, Table 4 shows that given the same level of per capita expenditure, provinces with a larger share of urban population or ethnic population had greater poverty. A higher share of population with high-school diploma reduced the poverty gap and poverty severity. A significant positive sign on lagged investment is, however, a puzzle. A possible explanation is that investment could have been mainly reserved for improving infrastructure, and poorer (and more remote) provinces were likely to have been allocated more investment.

3.2. Factors affecting provincial economic growth

[15] See Chambers and Dhongde (2011) for a review of different methods used to measure the growth elasticity of poverty reduction.

In the previous section, we found a strong negative relation between per capita expenditure levels and poverty and a positive relation between inequality and poverty. In this section, we analyze how poverty and inequality in turn affect economic growth. There is an extensive literature on the impact of inequality and poverty on economic growth, but there appears to be inconclusive evidence on the impact.[16]

In a recent paper, Marreo and Serven (2022) analyze the inequality-growth and the poverty-growth links. They start with the overlapping-generations model with learning-by-doing and knowledge spillovers (Aghion *et al.*, 1999), in which poor people have initial endowment below a minimum consumption level. The poor do not save and do not contribute to the aggregate economic growth. In this setting, this study shows that aggregate income growth depends on the share of people below the poverty threshold (i.e. poverty) and on the distribution of endowments (i.e. inequality). Using VHLSSs data, we estimate their reduced form empirical model:

$$Log(Y_{i,t}) - Log(Y_{i,t-1}) = \alpha + \beta Log(Y_{i,t-1}) + \gamma G_{i,t-1} + \mu P_{i,t-1} + \delta X'_{i,t-1}\gamma + \theta T_t + u_i + v_{i,t}, \quad (2)$$

Note that equation (2) is a standard model used to test conditional β-convergence in per capita expenditure (Barro and Sala-i-Martin, 1991).[17] Growth of per capita expenditure, which equals the difference between log of current per capita expenditure and log of lagged per capita expenditure, is regressed on lag of the control variables. This model is now modified by adding lagged values of inequality and poverty to the set of growth determinants. Clearly, we should be cautious and interpret the lagged Gini and poverty rate in equation (2) as having a correlational—rather than

[16] See Baselgia and Foellmi (2022), Cerra *et al.* (2022), and Ferreira *et al.* (2022) for recent reviews of the literature.
[17] Figure A.1 in Appendix A shows a scatter plot with initial expenditure levels and growth in expenditure in the following years. The scatter and the fitted line indicate that a negative relation between initial per capita expenditure levels and growth rates, suggesting β-convergence. Moreover, the correlation is higher for the long-term growth. It implies that in the long run provinces tend to be convergent in economic growth.

causal—relationship with income growth. Put differently, compared to equation (1), equation (2) presents a related, but different, hypothesis on the intertwined relationship between income growth, inequality, and poverty.

We present the estimation results for equation (2) in Table 5. We also re-estimate equation (2) using per capita income instead of per capita expenditure and show the estimates in Appendix A, Table A.3. In almost all the different specifications in Table 5, the estimated coefficient on lagged log of per capita expenditure is negative and significant at 5% or 1% level. Thus, there is evidence of conditional β-convergence of per capita expenditure across provinces. Provinces with higher expenditure experienced a lower growth rate. The estimate of the lagged log of per capita expenditure is larger in models with control variables than in those without control variables. According to the GMM model with control variables (column 4), if per capita expenditure in the current period increased by one percent, the growth rate of per capita expenditure in the next period is 0.55% lower. In other words, if per capita expenditure increases by one percent in the current period, per capita expenditure in the next period will increase by around half a percent (equal 1 minus 0.55).

In addition to finding evidence on conditional β-convergence across provinces, Table 5 shows strong negative correlation between inequality and growth in per capita expenditures. Poverty rates are not statistically significantly correlated with growth. Provinces with greater population density and a larger urban population share had faster growth.

We further modify equation (2) by adding the interaction terms between lagged per capita expenditure and lagged values of control variables (state spending, investment spending, population density, share of urban population, share of population with high-school diploma and share of ethnic minority) and show the estimation results in Appendix A, Table A.4. None of the

interaction terms are statistically significant though we still find strong evidence on conditional β-convergence.

4. Discussion and Conclusion

In this paper, we provide a comprehensive analysis of poverty and inequality trends in Vietnam in the past two decades. We compile new, extensive panel data at the province level over the past two decades using the Vietnam Household Living Standards Surveys and other data sources. We find that although average incomes between provinces tended to converge, there was a significant rise in within-province inequality over time. Within-province inequality was three times larger than between-province inequality in 2020. While economic growth helped reduce poverty, greater inequality could negatively affect poverty reduction as well as economic growth. Although poverty levels in the country declined significantly, the poor were increasingly segregated in certain provinces. In particular, provinces with larger share of ethnic minority groups had greater poverty levels.

SDG 1 calls to end poverty in all its forms. Certainly the goal refers to a broader notion of poverty. Admittedly a limitation of our analysis is that we are able to focus only on income poverty and do not measure changes in multi-dimensional poverty in Vietnam. However, goal 1 also emphasizes the need to address poverty in specific underserved geographic areas within each country. To that effect, our analysis examines a new aspect of poverty in the country and reveals a rise in the segregation of its poor. This new finding lends further support to those in the existing studies that poorer population groups are both spatially and ethnically concentrated (Benjamin, Brandt, and McCaig, 2017; Lanjouw, Marra, and Nguyen, 2017; Fujii, 2018). As such, although

Vietnam has made good progress in reducing overall poverty, geographically targeted policies can be designed to reach out to the remaining poor.

Our other contribution is to highlight the importance of reducing inequality. SDG 10 urges policy makers to accelerate progress towards lowering inequality within countries. Although inequality in Vietnam is lower compared to many other developing countries, we found a rising share of inequality within provinces. Greater inequality levels were negatively correlated with economic growth and positively correlated with poverty levels.

The recent Covid-19 pandemic can offer an illustrating example for both the importance of reducing inequality and poverty segregation. Analyzing Labor Force Surveys data spanning the pandemic, Dang, Nguyen, and Carletto (2023) find that the pandemic had far stronger effects on low-wage workers; specifically, it increased the proportion of below-minimum wage workers by 32% and also worsened various wage equality indexes. This study also finds that the pandemic effects were smaller in provinces with greater openness to the global economy (as measured by the share of exports and imports in provinces' GDP).

Indeed, geographical disadvantages could explain most of the non-farm participation gap in disadvantaged communities (World Bank, 2019). Furthermore, while national target programs that specially support poorer communes have sustained high commune level investments, a smaller share went to the poorest communes (Pimhidzai and Niu, 2021). As such, area-based poverty interventions can help effectively target and mitigate the disadvantages of fewer economic activities in lagging areas, which typically have less population density. Investment in both digital and physical infrastructure, such as building better Internet connection and roads, is beneficial for integrating these communities into the national (and global) economy.

References

Aghion, P., Caroli, E., & Garcia-Penalosa, C. (1999). Inequality and economic growth: the perspective of the new growth theories. *Journal of Economic Literature*, 37(4), 1615-1660.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *Review of Economic Studies*, 58(2), 277-297.

Barro, R. J. (2012). Convergence and modernization revisited (No. w18295). National Bureau of Economic Research.

Barro, R. J., Sala-i-Martin, X., Blanchard, O. J., & Hall, R. E. (1991). Convergence across states and regions. *Brookings Papers on Economic Activity*, 107-182.

Baselgia, E., & Foellmi, R. (2022). Inequality and growth: a review on a great open debate in economics. *WIDER Working Paper Series*, (wp-2022-5).

Benjamin, D., Brandt, L., & McCaig, B. (2017). Growth with equity: income inequality in Vietnam, 2002–14. *Journal of Economic Inequality*, 15(1), 25-46.

Bourguignon, F. (1979). Decomposable income inequality measures. *Econometrica*, 47(4): 901-920.

Bui, T. P., & Imai, K. S. (2019). Determinants of rural-urban inequality in Vietnam: Detailed decomposition analyses based on unconditional quantile regressions. *Journal of Development Studies*, 55(12), 2610-2625.

Cerra, M. V., Lama, M. R., & Loayza, N. (2022). "Links between growth, inequality, and poverty: a survey". In Cerra et al. (2022). (Eds.). How to Achieve Inclusive Growth. United Kingdom: Oxford University Press.

Chambers, D., & Dhongde, S. (2011). A Non-Parametric Measure of Poverty Elasticity. *Review of Income and Wealth*, 57(4), 683-703.

Dang, H. A. (2012). "Vietnam: A widening poverty gap for ethnic minorities. Indigenous Peoples, Poverty and Development". In Gillette Hall and Harry Patrinos. (Eds.) *Indigenous Peoples, Poverty and Development*. Cambridge University Press.

Dang, H. A. & Lanjouw, P. (forthcoming). "Regression-based imputation for poverty measurement in data scarce settings". In Jacques Silber. (Eds). *Handbook of Research on Measuring Poverty and Deprivation*. Edward Elgar Press.

Dang, H. A., Nguyen, C., & Carletto, C. (2023). Did a Successful Fight against COVID-19 Come at a Cost? Impacts of the pandemic on employment outcomes in Vietnam. *World Development*, 161, 106129.

Deaton, A., & Kozel, V. (2005). Data and dogma: the great Indian poverty debate. *World Bank Research Observer*, 20(2), 177-199.

Dhongde, S. (2017). Measuring Segregation of the Poor: Evidence from India. *World Development*, 89, 111-123.

Elbers, C., Lanjouw, J. O., & Lanjouw, P. (2003). Micro-level estimation of poverty and inequality. *Econometrica*, 71(1), 355-364.

Ferreira, F.H. (2010). "Distributions in Motion". In *Oxford Handbook of the Economics of Poverty*.

Ferreira, I. A., Salvucci, V., & Tarp, F. (2022). *Poverty, inequality, and growth: trends, policies, and controversies* (No. wp-2022-43). World Institute for Development Economic Research (UNU-WIDER).

Foster, J., Greer, J., & Thorbecke, E. (1984). A class of decomposable poverty measures. *Econometrica*, 52(3): 761-766.

Fujii, T. (2018). Has the development gap between the ethnic minority and majority groups narrowed in Vietnam?: Evidence from household surveys. *World Economy*, 41(8), 2067-2101.

Glewwe, P., & Dang, H. A. H. (2011). Was Vietnam's economic growth in the 1990s pro-poor? An analysis of panel data from Vietnam. *Economic Development and Cultural Change*, 59(3), 583-608.

Gradín, C. (2021). *Trends in global inequality using a new integrated dataset* (No. 2021/61). WIDER Working Paper.

Holtz-Eakin, D., Newey, W., & Rosen, H. S. (1988). Estimating vector autoregressions with panel data. *Econometrica*, 1371-1395.

Justino, P., & Litchfield, J. (2003). Poverty dynamics in rural Vietnam: winners and losers during reform. *Poverty Research Unit at Sussex Working Paper*, 10.

Lanjouw, P., Marra, M., & Nguyen, C. (2017). Vietnam's evolving poverty index map: Patterns and implications for policy. *Social Indicators Research*, 133(1), 93-118.

Le, H. T., & Booth, A. L. (2014). Inequality in Vietnamese Urban–Rural Living Standards, 1993–2006. *Review of Income and Wealth*, 60(4), 862-886.

Massey, D. S. (2016). "Segregation and the perpetuation of disadvantage". In *Oxford Handbook of the Social Science of Poverty*, *16*, 369-405.

Marrero, G. A., & Servén, L. (2022). Growth, inequality and poverty: a robust relationship?. *Empirical Economics*, 63(2), 725-791.

McCaig, B. (2011). Exporting out of poverty: Provincial poverty in Vietnam and US market access. *Journal of International Economics*, 85(1), 102-113.

Nguyen, C. V., & Pham, N. M. (2018). Economic growth, inequality, and poverty in Vietnam. *Asian-Pacific Economic Literature*, *32*(1), 45-58.

Nguyen, B. T., Albrecht, J. W., Vroman, S. B., & Westbrook, M. D. (2007). A quantile regression decomposition of urban–rural inequality in Vietnam. *Journal of Development Economics*, 83(2), 466-490.

Pham, A. T. Q., & Mukhopadhaya, P. (2018). Measurement of poverty in multiple dimensions: The case of Vietnam. *Social Indicators Research*, 138(3), 953-990.

Pimhidzai, O., & Niu, C. (2021). *Shared gains: How high growth and anti-poverty programs reduced poverty in Vietnam- Vietnam poverty and shared prosperity update report*. Washington, D.C.: World Bank Group.

World Bank. (1999). *Vietnam development report 2000: attacking poverty*. World Bank in Vietnam.

---. (2005). Poverty Manual. Chapter 6. http://siteresources.worldbank.org/PGLP/Resources/PovertyManual.pdf

---. (2018a). *World Development Indicators Online*.

---. (2018b). Piecing together the Poverty Puzzle. Washington DC: World Bank.

---. (2019). Better opportunities for all: Poverty reduction and shared prosperity in Vietnam. Washington, D.C.: World Bank Group.

Young, A. T., Higgins, M. J., & Levy, D. (2008). Sigma convergence versus beta convergence: Evidence from US county-level data. *Journal of Money, Credit and Banking*, 40(5), 1083-1093.

Table 1: National trends in per capita expenditure, inequality, and poverty

Indicators	Years									
	2002	2004	2006	2008	2010	2012	2014	2016	2018	2020
Per capita income (‘000 D)	4565.9	5335.9	6176.6	6414.9	9305.1	9680.7	10600.6	12044.0	14861.7	15156.3
	(88.1)	(142.6)	(140.5)	(171.4)	(225.8)	(184.7)	(144.5)	(172.9)	(223.3)	(197.1)
Per capita expenditure (‘000 D)	3476.1	4009.7	4519.2	4560.0	8520.3	8902.6	9586.5	11577.7	12376.8	14250.9
	(63.0)	(113.1)	(113.9)	(93.6)	(147.5)	(121.9)	(128.9)	(190.7)	(170.4)	(218.8)
Poverty estimate using the national expenditure poverty line										
Poverty rate (%)	28.8	19.5	16.0	14.5	20.7	17.2	13.5	9.8	7	4.7
	(0.6)	(1.0)	(0.8)	(0.8)	(0.6)	(0.6)	(0.5)	(0.5)	(0.4)	(0.3)
Poverty gap index	0.069	0.047	0.038	0.035	0.059	0.045	0.037	0.027	0.02	0.011
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)
Poverty severity index	0.024	0.017	0.014	0.012	0.024	0.017	0.015	0.010	0.008	0.004
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
Poverty estimate using the poverty line of 3.1$ PPP/day										
Poverty rate (%)	56.2	45.3	34.7	35.7	9.6	6.5	5.7	4.3	3.2	1.4
	(0.8)	(1.7)	(1.5)	(1.4)	(0.4)	(0.4)	(0.3)	(0.4)	(0.3)	(0.2)
Poverty gap index	0.187	0.141	0.103	0.100	0.023	0.014	0.013	0.010	0.007	0.003
	(0.003)	(0.006)	(0.005)	(0.005)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
Poverty severity index	0.081	0.061	0.042	0.040	0.008	0.005	0.005	0.003	0.001	0.023
	(0.002)	(0.003)	(0.002)	(0.002)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Gini	0.370	0.370	0.358	0.356	0.393	0.357	0.348	0.381	0.357	0.368
	(0.003)	(0.004)	(0.004)	(0.005)	(0.006)	(0.004)	(0.004)	(0.005)	(0.004)	(0.005)
Theil L index	0.221	0.224	0.212	0.208	0.259	0.213	0.205	0.246	0.219	0.231
	(0.008)	(0.007)	(0.006)	(0.006)	(0.009)	(0.006)	(0.006)	(0.008)	(0.006)	(0.007)
Theil T index	0.249	0.241	0.227	0.227	0.294	0.230	0.216	0.265	0.226	0.247
	(0.010)	(0.007)	(0.008)	(0.008)	(0.014)	(0.009)	(0.009)	(0.013)	(0.007)	(0.011)

Note: i) Authors’ estimation from VHLSSs. ii) Standard errors in parentheses. iii) Per capita income and expenditure in thousand VND, adjusted to constant prices in 2002

Table 2: Percent share of inequality in per capita expenditures within and between provinces

Inequality index	Years									
	2002	2004	2006	2008	2010	2012	2014	2016	2018	2020
Theil L										
Within	65.8	68.8	73.8	76.4	72.1	77.9	78.4	72.3	77.4	73.2
Between	34.2	31.2	26.2	23.6	27.9	22.1	21.6	27.7	22.6	26.8
Theil T										
Within	64.6	67.4	73.7	76.2	73.5	78.6	79.1	72.9	78.1	74.1
Between	35.4	32.6	26.3	23.8	26.5	21.4	20.9	27.1	21.9	25.9

Note: i) Authors' estimation from VHLSSs

Table 3: Indices measuring provincial segregation

Year	Dissimilarity Index	Gini Index
2002	0.21	0.30
2004	0.26	0.36
2006	0.28	0.38
2008	0.23	0.32
2010	0.24	0.34
2012	0.28	0.38
2014	0.32	0.45
2016	0.40	0.53
2018	0.50	0.66
2020	0.50	0.61

Note: i) Authors' estimation based on VHLSSs data

Table 4: Factors related to provincial poverty (GMM estimation)

Explanatory variables	Dependent variable is the poverty indexes of provinces					
	Poverty headcount		Poverty gap index		Poverty severity index	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged log of per capita expenditure	-0.3122***	-0.2997***	-0.0533***	-0.1126***	-0.0229***	-0.0518***
	(0.010)	(0.019)	(0.002)	(0.009)	(0.001)	(0.005)
Lagged Gini index	0.7193***	0.285***	1.1841***	0.361***	0.5737***	0.1811***
	(0.171)	(0.091)	(0.042)	(0.043)	(0.022)	(0.023)
Lagged log of State spending		0.00068		-0.0006		0.0003
		(0.0016)		(0.0007)		(0.000)
Lagged log of investment spending		0.0141***		0.007***		0.004***
		(0.0036)		(0.002)		(0.001)
Lagged log of population density		-0.0088**		-0.0064***		-0.003***
		(0.004)		(0.002)		(0.001)
Lagged share of urban population		0.0009***		0.0004***		0.0002***
		(0.000)		(0.000)		(0.000)
Lagged share of population with high-school diploma		0.07		-0.0827**		-0.046**
		(0.073)		(0.034)		(0.018)
Lagged share of ethnic minority population		0.00108***		0.0005***		0.0002***
		(0.000)		(0.000)		(0.000)
Year dummies	No	Yes	No	Yes	No	Yes
Constant	2.658***	2.43***	0.126***	0.812***	0.0312**	0.359***
	(0.115)	(0.188)	(0.028)	(0.089)	(0.015)	(0.047)
Observations	504	504	504	504	504	504
Number of provinces	63	63	63	63	63	63
Arellano-Bond test for AR(1)	0.000	0.000	0.000	0.000	0.000	0.000
Arellano-Bond test for AR(2)	0.23	0.000	0.000	0.272	0.016	0.705
P-value in Sargan test	0.043	0.000	0.000	0.000	0.000	0.000

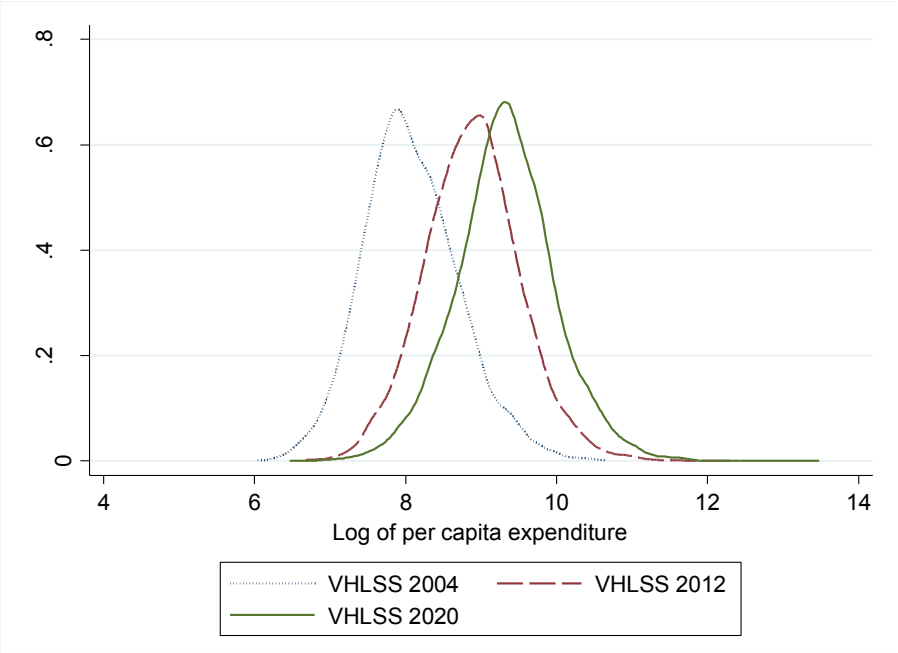
Note: i) Authors' estimation from VHLSSs ii) Robust standard errors in parentheses iii)*** p<0.01, ** p<0.05, * p<0.1.

Table 5: Relation between expenditure growth, poverty, and inequality

Explanatory variables	Dependent variable is the growth of per capita expenditure (Log Y_t – Log Y_{t-1})			
	OLS		GMM	
	Model 1	Model 2	Model 3	Model 4
	(1)	(2)	(3)	(4)
Lagged log of per capita expenditure	-0.0796*	-0.317***	-0.1667***	-0.55***
	(0.033)	(0.046)	(0.032)	(0.046)
Lagged Gini index	-0.448***	-0.613***	-0.719***	-0.876***
	(0.121)	(0.14)	(0.149)	(0.16)
Lagged poverty rate	0.113	-0.095	-0.0054	-0.178***
	(0.065)	(0.062)	(0.069)	(0.0696)
Lagged log of other State spending		0.001		0.002
		(0.001)		(0.003)
Lagged log of investment spending		0.0024		0.003
		(0.006)		(0.006)
Lagged log of population density		0.021***		0.043***
		(0.006)		(0.007)
Lagged share of urban population		0.0013***		0.00265***
		(0.000)		(0.000)
Lagged share of population with high-school diploma		0.265**		0.184
		(0.131)		(0.148)
Lagged share of ethnic minority population		-0.0001		-0.000
		(0.000)		(0.000)
Lagged share of wage income		0.192***		0.32***
		(0.064)		(0.071)
Lagged share of non-farm income		0.111		0.178**
		(0.079)		(0.09)
Lagged share of other non-farm income		-0.137		-0.0956
		(0.107)		(0.11)
Year dummies	No	Yes	No	Yes
Constant	0.932**	2.835***	1.725***	4.783***
	(0.292)	(0.384)	(0.292)	(0.391)
Observations	567	567	567	567
R-squared	0.8247	0.8427		
Number of tinh			63	63
Arellano-Bond test for AR(1)			0.000	0.000
Arellano-Bond test for AR(2)			0.000	0.000
P-value in Sargan test			0.000	0.000

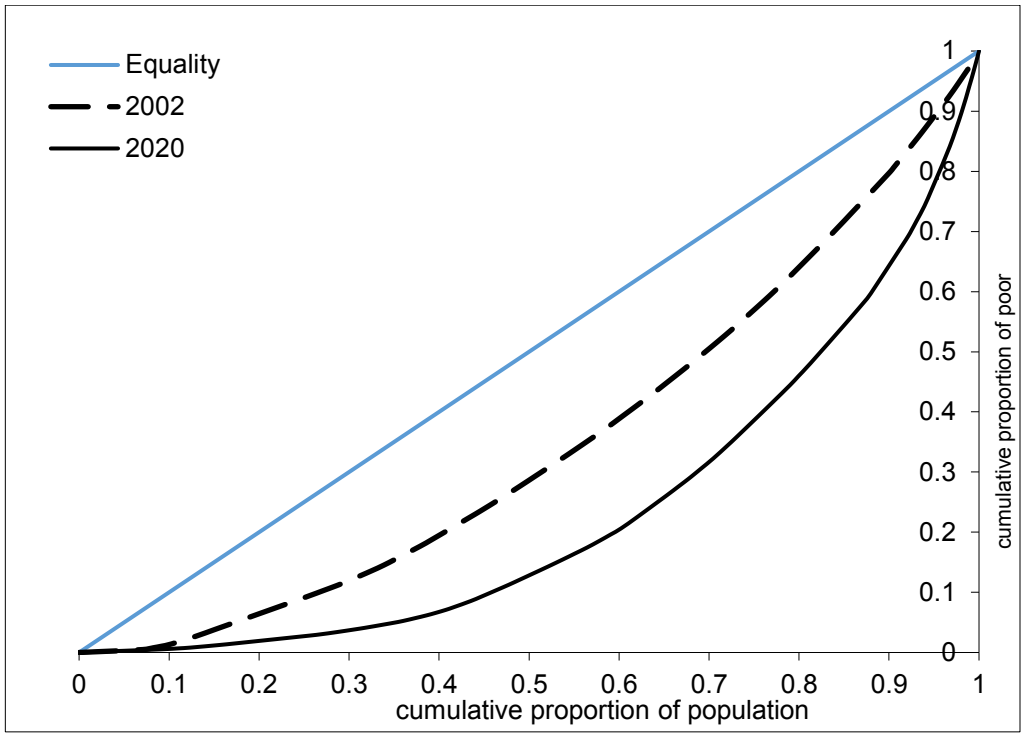
Note: i) Authors' estimation from VHLSSs ii) Robust standard errors in parentheses iii)*** p<0.01, ** p<0.05, * p<0.1.

Figure 1: Density of log of per capita expenditure over time



Note: i) Authors' estimation based on VHLSSs data

Figure 2: Segregation of the poor across provinces in Vietnam: 2002-2020



Note: i) Authors' estimation based on VHLSSs data

Appendix A: Additional Tables and Figures

Table A.1: Average income, inequality and poverty rates among provinces in Vietnam in 2020

Province name	Province code	VHLSS 2004				VHLSS 2012				VHLSS 2020			
		Per capita income (thousand VND)	Per capita expend. (thousand VND)	Poverty rate (%)	Gini	Per capita income (thousand VND)	Per capita expend. (thousand VND)	Poverty rate (%)	Gini	Per capita income (thousand VND)	Per capita expend. (thousand VND)	Poverty rate (%)	Gini
Red River Delta													
Hà Nội	1	7,569	6,151	9.0	0.318	34,292	34,666	6.7	0.350	70,183	68,586	0.4	0.321
Quảng Ninh	22	8,061	5,411	10.3	0.342	30,562	27,687	13.7	0.368	53,041	47,940	3.7	0.319
Vĩnh Phúc	26	4,847	3,534	17.8	0.270	22,186	22,806	13.7	0.310	58,206	49,875	0.5	0.300
Bắc Ninh	27	5,891	4,482	8.4	0.279	29,435	26,730	6.0	0.306	68,768	54,120	0.0	0.281
Hải Dương	30	5,414	4,175	11.1	0.266	24,565	23,870	8.3	0.294	57,274	49,202	0.3	0.297
Hải Phòng	31	6,484	5,565	8.1	0.363	30,426	27,745	6.5	0.311	67,333	58,427	0.3	0.302
Hưng Yên	33	5,156	3,551	15.9	0.268	21,704	23,985	8.8	0.290	51,696	44,467	0.8	0.286
Thái Bình	34	4,586	3,676	14.8	0.259	20,488	21,297	12.3	0.295	56,373	44,839	1.1	0.275
Hà Nam	35	4,284	3,431	23.3	0.283	21,282	22,668	13.1	0.303	51,912	49,058	1.1	0.311
Nam Định	36	4,860	3,680	18.1	0.303	21,864	22,558	9.5	0.294	57,699	48,829	0.9	0.313
Ninh Bình	37	4,436	3,813	15.5	0.291	20,385	22,692	11.7	0.314	50,993	47,557	1.0	0.306
Northern Mountain													
Hà Giang	2	2,965	2,395	57.2	0.371	10,131	10,403	70.5	0.381	22,811	22,916	41.1	0.466
Cao Bằng	4	3,344	3,009	43.0	0.350	13,386	14,279	49.2	0.388	27,336	29,094	24.6	0.424
Bắc Kạn	6	3,265	2,730	42.7	0.312	14,306	15,161	42.2	0.356	27,778	28,930	18.7	0.391
Tuyên Quang	8	4,085	3,311	34.4	0.339	14,666	16,586	38.2	0.366	37,344	32,360	8.1	0.317
Lào Cai	10	3,362	2,937	53.5	0.400	13,831	15,817	51.6	0.441	30,663	29,258	21.5	0.426
Điện Biên	11	2,690	2,058	68.8	0.355	10,445	9,985	72.7	0.383	21,853	21,397	45.6	0.458
Lai Châu	12	2,579	1,949	70.9	0.339	9,424	9,619	74.4	0.400	24,449	21,207	35.9	0.385
Sơn La	14	3,326	2,416	59.0	0.372	12,526	12,048	60.4	0.361	27,329	24,156	30.4	0.393
Yên Bái	15	3,935	3,190	36.1	0.343	13,772	16,261	43.9	0.389	32,735	32,504	18.2	0.397
Hoà Bình	17	3,491	2,816	48.9	0.365	14,762	16,561	37.2	0.375	34,479	33,871	9.1	0.385
Thái Nguyên	19	4,761	4,005	23.6	0.340	21,266	22,855	16.5	0.341	43,535	42,082	4.0	0.309
Lạng Sơn	20	4,184	3,217	38.0	0.359	14,451	15,290	46.5	0.392	30,544	30,678	10.4	0.340
Bắc Giang	24	4,709	3,553	20.9	0.301	19,870	19,337	23.4	0.319	50,049	42,191	1.7	0.283
Phú Thọ	25	4,441	3,454	25.9	0.313	18,987	20,477	18.8	0.331	42,208	42,264	2.6	0.315
Central Coast													
Thanh Hoá	38	3,727	3,040	34.9	0.313	15,455	18,394	27.3	0.332	47,451	37,421	4.5	0.331
Nghệ An	40	3,750	3,087	33.2	0.304	16,561	19,018	26.2	0.343	49,245	36,426	8.9	0.348
Hà Tĩnh	42	3,690	3,218	31.6	0.305	16,259	20,775	17.9	0.318	42,545	38,686	4.7	0.342
Quảng Bình	44	3,617	3,158	33.9	0.308	17,270	20,239	23.3	0.349	43,326	37,591	8.7	0.353
Quảng Trị	45	3,657	2,956	37.5	0.313	16,140	18,386	30.5	0.362	36,003	36,802	12.8	0.391

Province name	Province code	VHLSS 2004				VHLSS 2012				VHLSS 2020			
		Per capita income (thousand VND)	Per capita expend. (thousand VND)	Poverty rate (%)	Gini	Per capita income (thousand VND)	Per capita expend. (thousand VND)	Poverty rate (%)	Gini	Per capita income (thousand VND)	Per capita expend. (thousand VND)	Poverty rate (%)	Gini
Thừa Thiên Huế	46	4,578	3,945	22.1	0.340	19,724	22,144	14.7	0.340	41,907	40,520	4.6	0.328
Đà Nẵng	48	8,043	6,859	2.9	0.305	34,565	35,850	3.2	0.336	61,791	70,096	0.3	0.321
Quảng Nam	49	3,924	3,295	28.4	0.300	17,434	18,872	22.5	0.312	44,941	42,968	4.5	0.320
Quảng Ngãi	51	4,048	3,499	22.6	0.292	15,684	18,303	25.7	0.324	40,594	38,232	8.0	0.361
Bình Định	52	5,021	4,107	21.1	0.333	20,673	21,349	14.6	0.313	43,066	44,340	2.1	0.336
Phú Yên	54	4,516	3,627	22.5	0.303	17,413	19,321	16.9	0.297	39,255	38,622	6.4	0.319
Khánh Hoà	56	5,676	4,555	16.5	0.340	21,138	24,903	14.3	0.348	40,098	44,819	3.8	0.318
Ninh Thuận	58	4,667	4,494	20.8	0.374	17,061	20,129	21.9	0.325	36,271	39,373	7.9	0.369
Bình Thuận	60	5,338	4,924	10.9	0.339	21,012	22,304	14.1	0.298	49,947	43,601	2.1	0.310
Central Highlands													
Kon Tum	62	4,084	3,015	47.8	0.402	17,072	16,731	47.6	0.422	36,165	33,221	16.8	0.411
Gia Lai	64	4,431	3,047	46.1	0.381	22,246	17,663	36.3	0.375	29,994	27,393	26.7	0.391
Đắk Lắk	66	4,622	3,211	37.0	0.372	20,877	18,844	30.4	0.365	35,057	33,144	14.1	0.349
Đắk Nông	67	4,257	2,975	32.0	0.295	20,059	18,240	23.9	0.314	35,779	36,117	7.5	0.333
Lâm Đồng	68	5,324	3,813	26.6	0.339	22,353	24,150	18.7	0.345	47,473	43,901	5.2	0.358
Southeast													
Bình Phước	70	5,848	4,502	14.4	0.319	26,671	22,980	11.8	0.291	50,678	48,115	3.4	0.362
Tây Ninh	72	5,721	4,627	11.3	0.312	23,193	21,192	14.0	0.284	53,535	47,888	0.8	0.312
Bình Dương	74	9,335	6,379	3.4	0.307	42,197	27,204	6.2	0.294	84,979	53,861	0.0	0.287
Đồng Nai	75	8,140	5,571	6.8	0.313	29,374	25,884	8.9	0.310	70,667	59,240	0.9	0.319
Bà Rịa - Vũng Tàu	77	7,868	6,372	6.2	0.345	33,363	29,922	5.2	0.318	54,245	68,820	0.2	0.344
Hồ Chí Minh	79	13,943	9,490	1.9	0.307	40,295	34,009	3.7	0.321	77,646	85,497	0.0	0.329
Mekong River Delta													
Long An	80	6,000	4,460	9.7	0.287	23,282	21,779	11.3	0.290	54,063	42,739	1.7	0.308
Tiền Giang	82	5,750	4,399	10.7	0.292	22,983	23,416	10.9	0.303	54,663	41,873	0.6	0.305
Bến Tre	83	4,999	4,121	12.8	0.295	20,071	20,014	15.5	0.305	47,149	37,194	1.7	0.288
Trà Vinh	84	4,755	3,614	20.3	0.301	18,860	17,416	27.8	0.331	50,631	33,305	8.3	0.335
Vĩnh Long	86	5,077	4,032	15.0	0.288	20,972	22,020	14.5	0.321	43,349	39,023	2.0	0.293
Đồng Tháp	87	5,687	4,492	16.7	0.458	19,400	19,866	19.3	0.321	52,289	34,445	4.5	0.289
An Giang	89	6,218	3,883	20.3	0.297	22,574	17,921	20.3	0.292	44,669	33,414	6.5	0.323
Kiên Giang	91	6,130	3,819	22.4	0.331	23,627	18,770	28.1	0.362	62,005	32,432	10.6	0.335
Cần Thơ	92	6,292	4,886	13.4	0.352	28,090	23,662	13.4	0.333	64,735	44,047	1.8	0.326
Hậu Giang	93	5,387	3,486	22.0	0.286	19,450	18,489	27.9	0.333	53,440	35,402	5.3	0.302
Sóc Trăng	94	4,742	3,437	24.7	0.304	17,860	17,636	29.4	0.349	47,319	32,997	7.7	0.360
Bạc Liêu	95	5,610	3,583	22.8	0.305	24,444	19,485	22.8	0.326	51,605	34,829	7.2	0.357
Cà Mau	96	6,176	3,950	19.4	0.318	19,811	18,571	22.3	0.317	39,848	34,263	6.8	0.323

Note: i) Authors' estimation from the 2020 VHLSS.

Table A.2: Factors related to provincial poverty (OLS estimation)

Explanatory variables	Dependent variable is the poverty indexes of provinces					
	Poverty headcount		Poverty gap index		Poverty severity index	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Lagged log of per capita expenditure	-0.348***	-0.403***	-0.057***	-0.055***	-0.02467***	-0.0233***
	(0.010)	(0.012)	(0.003)	(0.004)	(0.002)	(0.002)
Lagged Gini index	0.682***	0.228**	0.8768***	0.416***	0.4296***	0.212***
	(0.111)	(0.113)	(0.0545)	(0.04)	(0.030)	(0.035)
Lagged log of State spending		0.0002		0.0015**		0.0007*
		(0.0001)		(0.004)		(0.000)
Lagged log of investment spending		0.011**		0.0078***		0.004***
		(0.004)		(0.0019)		(0.001)
Lagged log of population density		0.002		-0.0089***		-0.004***
		(0.004)		(0.0016)		(0.001)
Lagged share of urban population		0.0014***		-0.0001		-0.000
		(0.000)		(0.000)		(0.000)
Lagged share of population with high-school diploma		0.201*		-0.126***		-0.069***
		(0.103)		(0.034)		(0.019)
Lagged share of ethnic minority population		0.0009***		0.0007***		0.0004***
		(0.000)		(0.000)		(0.000)
Year dummies	No	Yes	No	Yes	No	Yes
Constant	2.995***	3.454***	0.2612***	0.240***	0.0936***	0.079***
	(0.0996)	(0.095)	(0.027)	(0.0338)	(0.014)	(0.018)
Observations	567	567	567	567	567	567
R-squared	0.741	0.9137	0.6554	0.7964	0.5959	0.7314

Note: i) Authors' estimation from VHLSSs ii) Robust standard errors in parentheses iii)*** p<0.01, ** p<0.05, * p<0.1.

Table A.3: Relation between income growth, poverty and income inequality

Explanatory variables	Dependent variable is the growth of per capita income ($\text{Log } Y_t - \text{Log } Y_{t-1}$)			
	OLS		GMM	
	Model 1	Model 2	Model 3	Model 4
Lagged log of per capita income	-0.0904***	-0.213***	-0.161***	-0.41***
	(0.03)	(0.042)	(0.032)	(0.039)
Lagged Gini index	-0.3377**	-0.245**	-0.617***	-0.40***
	(0.160)	(0.119)	(0.0969)	(0.09)
Lagged poverty rate	-0.0567	-0.068	-0.045	-0.128*
	(0.061)	(0.075)	(0.072)	(0.074)
Lagged log of other State spending		-0.0037		-0.0032
		(0.004)		(0.003)
Lagged log of investment spending		0.004		0.0032
		(0.007)		(0.007)
Lagged log of population density		0.0275***		0.061***
		(0.007)		(0.007)
Lagged share of urban population		0.001**		0.0025***
		(0.000)		(0.000)
Lagged share of population with high-school diploma		0.133		-0.03
		(0.151)		(0.155)
Lagged share of ethnic minority population		-0.0005**		-0.0004*
		(0.000)		(0.000)
Lagged share of wage income		0.0576		0.119
		(0.081)		(0.075)
Lagged share of non-farm income		-0.192*		-0.283***
		(0.107)		(0.095)
Lagged share of other non-farm income		-0.024		-0.184
		(0.121)		(0.117)
Year dummies	No	Yes	No	Yes
Constant	1.11***	2.12***	1.732***	3.855***
	(0.294)	(0.368)	(0.283)	(0.342)
Observations	567	567	567	567
R-squared	0.3011	0.3611		
Number of tinh			63	63
Arellano-Bond test for AR(1)			0.000	0.000
Arellano-Bond test for AR(2)			0.106	0.306
P-value in Sargan test			0.001	0.080

Note: i) Authors' estimation from VHLSSs ii) Robust standard errors in parentheses iii)*** p<0.01, ** p<0.05, * p<0.1.

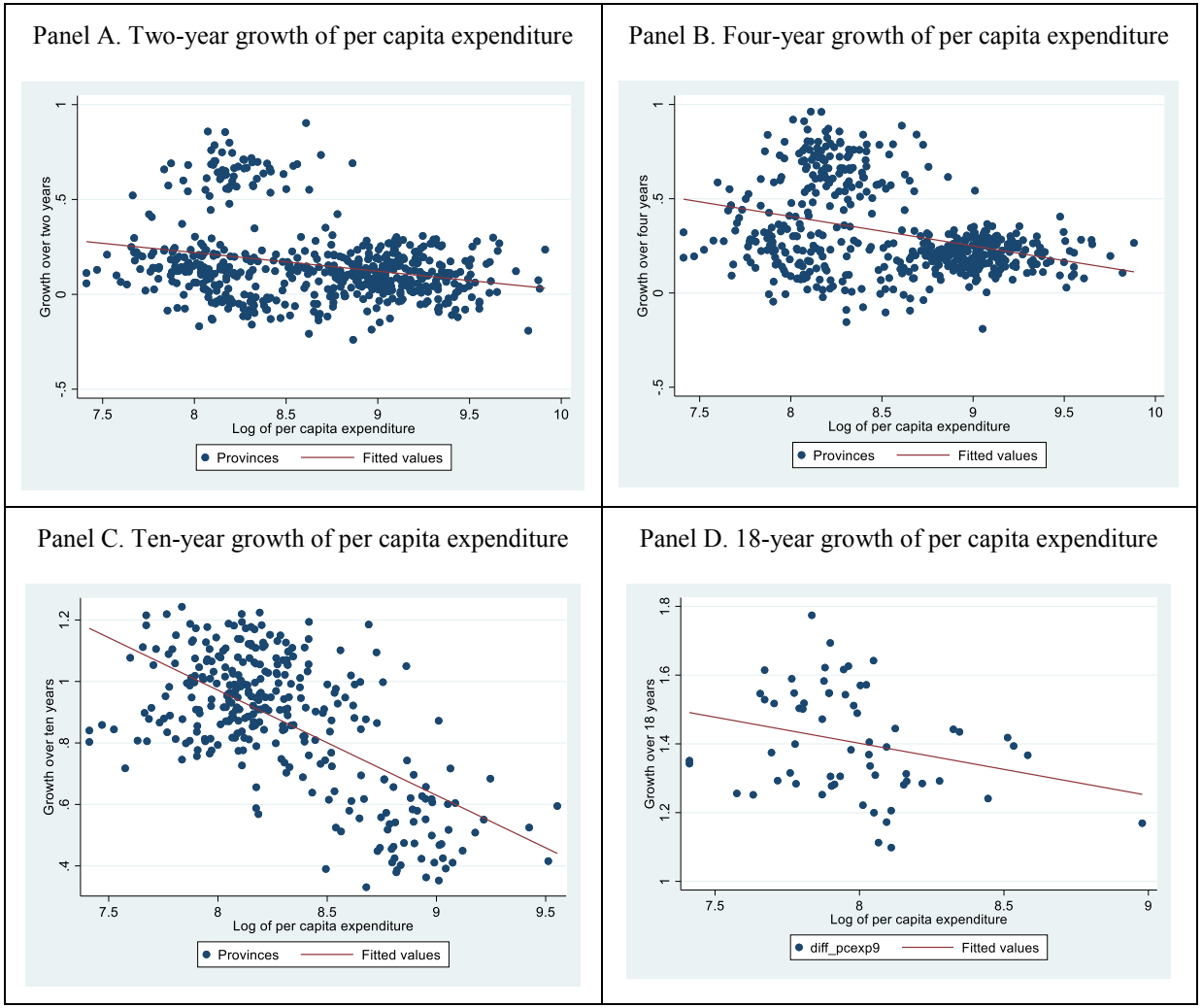
Table A.4: Relation between growth, poverty and inequality with interactions

Explanatory variables	Dependent variable is the growth of per capita expenditure (Log Y_t – Log Y_{t-1})							
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Lagged log of per capita expenditure	-0.639***	-0.336	-0.34***	-0.397***	-0.446***	-0.382***	-0.416***	-0.484***
	(0.152)	(0.246)	(0.131)	(0.096)	(0.092)	(0.083)	(0.109)	(0.077)
Lagged log of per capita expenditure * Lagged log of other State spending	0.0087							
	(0.007)							
Lagged log of per capita expenditure * Lagged log of investment spending		-0.009						
		(0.014)						
Lagged log of per capita expenditure * Lagged log of population density			-0.0015					
			(0.012)					
Lagged log of per capita expenditure * Lagged share of urban population				0.0005				
				(0.001)				
Lagged log of per capita expenditure * Lagged share of population with high-school diploma					-0.336			
					(0.41)			
Lagged log of per capita expenditure * Lagged share of ethnic minority population						0.0009*		
						(0.001)		
Lagged log of per capita expenditure * Lagged Gini index							0.315	
							(0.322)	
Lagged log of per capita expenditure * Lagged poverty rate								-0.028
								(0.072)
Lagged log of other State spending	-0.076	-0.0069	-0.0017	-0.001	-0.005	-0.003	-0.0028	-0.0015
	(0.064)	(0.005)	(0.004)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)
Lagged log of investment spending	-0.0085	0.073	0.0275	-0.016	0.040**	-0.0013	-0.0017	0.001***
	(0.012)	(0.123)	(0.018)	(0.017)	(0.018)	(0.016)	(0.017)	(0.014)
Lagged log of population density	0.0634***	0.068***	0.155	-0.0034**	0.042***	-0.0044***	0.0531***	0.059***
	(0.017)	(0.019)	(0.11)	(0.015)	(0.016)	(0.017)	(0.014)	(0.014)
Lagged share of urban population	0.0023***	0.0020***	0.0013*	-0.0037	0.0018**	0.0015*	0.0014*	0.0018***
	(0.001)	(0.001)	(0.001)	(0.007)	(0.001)	(0.001)	(0.001)	(0.001)
Lagged share of population with high-school diploma	0.934***	0.612*	0.245	0.887***	3.164	0.289	0.614*	0.602**
	(0.354)	(0.333)	(0.405)	(0.340)	(3.495)	(0.361)	(0.356)	(0.275)
Lagged share of ethnic minority population	0.0003	-0.0002	0.0003	-0.0002	-0.0003	-0.007	0.0007	0.0005
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.005)	(0.000)	(0.000)
Lagged Gini index	-1.32***	-1.387***	-1.4***	-0.844**	-1.12***	-1.41***	-3.43	-1.07***
	(0.279)	(0.323)	(0.314)	(0.350)	(0.344)	(0.318)	(2.85)	(0.287)
Lagged poverty rate	-0.0835	-0.005	0.012	-0.134	-0.0515	0.014	-0.016	0.170
	(0.102)	(0.138)	(0.131)	(0.139)	(0.113)	(0.164)	(0.106)	(0.538)
Lagged share of wage income	0.157	0.346**	0.318*	0.336**	0.222	0.352**	0.197	0.242*
	(0.156)	(0.159)	(0.172)	(0.17)	(0.145)	(0.143)	(0.148)	(0.142)

Explanatory variables	Dependent variable is the growth of per capita expenditure (Log Y_t – Log Y_{t-1})							
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Lagged share of non-farm income	0.253	0.109	0.432**	-0.226	-0.378*	0.28	0.317*	0.572***
	(0.192)	(0.165)	(0.203)	(0.18)	(0.198)	(0.225)	(0.185)	(0.19)
Lagged share of other non-farm income	-0.365	-0.515*	-0.541**	-0.473**	-0.452**	-0.384	-0.386	-0.338
	(0.233)	(0.27)	(0.229)	(0.234)	(0.217)	(0.251)	(0.238)	(0.267)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	5.785***	3.24	3.562***	3.67***	3.462***	3.924***	3.84***	4.177***
	(1.31)	(2.13)	(0.712)	(0.801)	(0.781)	(0.779)	(0.949)	(0.6728)
Observations	504	504	504	504	504	504	504	504
Number of tinh	63	63	63	63	63	63	63	63
Arellano-Bond test for AR(1)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Arellano-Bond test for AR(2)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
P-value in Sargan test	0.000	0.000	0.016	0.000	0.000	0.000	0.000	0.000

Note: i) Authors' estimation from VHLSSs ii) Robust standard errors in parentheses iii)*** p<0.01, ** p<0.05, * p<0.1.

Figure A.1: Growth of per capita expenditure and initial expenditure level



Note: i) Authors' estimation using VHLSSs data