



The effect of various income sources on income inequality: a comparison across ethnic groups in Vietnam

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Abstract

This study explores the dynamics of income and income inequality in Vietnam from 2004 to 2014. Two main population subgroups are investigated: the ethnic majority, known as the Kinh people, and the minority group, which includes 53 minor ethnicities in Vietnam. The findings show that the income gap among ethnic groups has increased over the last decade. The Gini index decomposition indicates that wages and nonfarm business income are the two main determinants of income inequality. Cultivation and agricultural side-line incomes were relatively evenly distributed, despite their recent smaller equalizing effect. Both sub-population groups have experienced a declining contribution from the agricultural sector to overall household income. Changes in income inequality in Vietnam by income source reflect the change in the structure of the economy from reliance on agriculture to non-agricultural economic activities.

Keywords Income inequality · Ethnicity · Decomposition · Vietnam

JEL Classification D31 · D33 · D63

1 Introduction

Vietnam has attained great success in socio-economic development over the last decades. By 2010, the country was transformed from one of the world's poorest nations into a lower middle-income country (World Bank and Ministry of Planning and Investment of Vietnam

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2016) and is among very few countries to achieve one of the fastest rates of poverty reduction in the world (WB 2015). Vietnam has also reached most of its Millennium Development Goals (WB 2013). Despite these achievements, growth is slowing and economic inequality is growing, threatening decades of progress (Oxfam 2017).

The data show that by any measure, the absolute income gap between richest and poorest in Vietnam has become greater (Benjamin et al. 2017; Kozel 2014; Oxfam 2017). In 2015, the daily income of the richest was found to be equal to the 10-year income of the poorest (Oxfam 2017). In Vietnam in 2014, the average per capita income of the richest 20% of households was at least 9.7 times higher than that of the poorest 20% (GSO 2015a, b) and this quantile ratio is much higher (7.2 times) than was the mean quantile ratio for the 33 economies in Asia and the Pacific by the late 2000s (Kanbur et al. 2014). In addition, the income gap between rural and urban households has widened, and there is concern about rapidly increasing income disparity in rural areas. Indeed, the Gini coefficient in rural areas increased from 0.360 in 2002 to 0.40 in 2014, but remained stable for urban areas at 0.39 (GSO 2015a, b). This disparity results mainly from the over-representation of ethnic minorities in the poorest group in rural areas.

The data show that both poverty and inequality remain highest for ethnic minorities. While inequality has remained almost unchanged for the Kinh majority group, the Gini index of ethnic minority income increased from 0.343 to 0.394 during the 2002–2014¹ period (GSO 2015a, b). Ethnic minorities account for less than 15% of the total population but 70% of the extremely poor (Oxfam 2017). It is estimated that by 2016, about 30% of ethnic minorities were poor, but only 4% of the Kinh majority lived below the poverty line.²

High inequality among ethnic minorities may cause a number of socio-economic problems. It can threaten sustainable development by increasing social costs, ineffective growth policies, weakening growth efficiency, dampening growth drivers, and causing financial crises, global imbalances and conflicts, resulting in slowing poverty reduction (Dabla-Norris et al. 2015). A better understanding of what causes changes in income distribution among the Kinh majority and ethnic minority groups is of great importance for designing policy interventions for poverty reduction and equality in Vietnam. This consideration motivates us to conduct the current study.

Our study makes several contributions to the literature. *First*, we provide updated estimates of the contribution of income sources to overall income inequality and their impact on it, using a Gini decomposition by income source. This approach allows us to explain why some income sources increase inequality, while others reduce it. *Second*, this study provides an analysis of long-term changes in income components which caused variation in income distribution in Vietnam over the 10-year period from 2004 to 2014. *Third*, in previous studies, income from social welfare and government transfers has often been aggregated into the “other income” category (Tran 2015; Tran et al. 2014). In the current research, however, this income is considered separately. As a result, the decomposed marginal effect of the income source allows evaluation of the effect of social welfare and government transfers on income inequality.

The study is organized as follows. The next section provides an overview of ethnicity and the relevant literature in Vietnam. Section 3 outlines the data and methodology.

¹ Authors' calculation based on data from the 2002–2014 VHLSS.

² Authors' calculation based on data from the 2016 VHLSS and using the updated poverty line for the 2016–2020 period.

Section 4 provides results and discussion. Finally, Sect. 5 contains the conclusion and policy implications.

2 Background of the study and literature review

Vietnam has 54 officially recognized ethnic groups, with more than 85% of the population made up of the Kinh people, who comprise the ethnic majority group. The remaining 15% of the population is distributed among 53 ethnic minorities. Most of these ethnic groups, however, are made up of only a few thousand people. According to the General Statistics Office Vietnam (GSO 2015a, b), of the ethnic minority groups, the most numerous are the Tay (1.9%), Thai (1.8%), Muong (1.5%), Kho Me (1.5%), H'Mong (1.2%) and Nung (1.1%). Most ethnic minority groups reside in mountainous areas, while the Kinh and Chinese are found in the lowland areas in the Red River delta, Central Coast and Mekong Delta. By comparison, the minority groups are primarily located in the north-east and north-west mountains, in the central highlands, and on the north central coast.

Since the economic reform introduced in 1986, known as “*Đổi mới*”, both majority and minority ethnic groups have experienced a great improvement in living standards, reflected in poverty reduction, increasing average expenditure/income per capita, falling fertility rates and household size, and a decline in the level of malnutrition (Epprecht et al. 2011). However, Vietnam's ethnic minority groups have lagged behind the Kinh ethnic majority. Ethnic minorities account for most of the poor in Vietnam. Although they make up only 15% of Vietnam's total population, in 2013 ethnic minorities accounted for about half of the poor and 68% of the extremely poor (Kozel 2014). An increasing number of studies have examined the gap in living standards between minorities and the majority Kinh population (Baulch 2011; Van de Walle and Gunewardena 2001; World Bank 2009; Nguyen et al. 2017). In general, these studies have found that differences in household characteristics and assets and returns on these are the main reasons explaining why ethnic minorities continue to lag behind the majority Kinh population.

The rural sector has been the driving force behind the rise in income inequality in recent years (World Bank 2013). The World Bank (2013) also notes that the rise in income inequality in rural Vietnam has resulted from changes in the constitutive components of household income, shifting from agricultural to non-agricultural sources and from low-skill to higher-skill employment outside the agricultural sector (World Bank 2013). An increasing number of studies in recent years have examined the contribution of different income sources to overall income inequality and their impact on it in rural and urban Vietnam (McCaig et al. 2015; Cam and Akita 2008), peri-urban Vietnam (Tran et al. 2014), Vietnam's Northwest region (Tran 2016) and Vietnam as a whole (McCaig et al. 2015).

When examining the contribution of income sources to overall inequality in rural and urban areas during the 2002–2012 period, McCaig et al. (2015) showed that wage income emerged as a major contributor to overall inequality in both rural and urban areas because of its large and increasing income share, as it is still highly correlated with overall income. In addition, McCaig et al. (2015) found that wage inequality accounted for most of the rise in overall inequality in the rural area between 2002 and 2012. While wage inequality actually declined as more households derived income from wage-paying activities, the contribution of wage earnings increased among rural households. Nevertheless, the decline in inequality within urban households during the same period resulted from a significant

reduction in the inequality-increasing effect of business income, and especially remittances (McCaig et al. 2015).

Using data from the 2010 Northern Mountains Baseline Survey (NMBS), Tran (2016) analysed the sources of income inequality among ethnic minorities in the Northwest region, the poorest region with the highest level of inequality in Vietnam. This study reveals that agricultural income, notably crop income, substantially reduces income inequality, whereas off-farm income sources (wage and nonfarm self-employment incomes) increase inequality. The author explained that in comparison with other income sources, agricultural income is more equally distributed and is the main income source for many poor households. In contrast, off-farm income sources, gifts, and remittances are more unequally distributed and flow disproportionately towards the better off. Nguyen and Tran (2018) examined the role of forest income in inequality among households in the poorest districts of Vietnam's North Central Provinces. They found that forest income was a major contributor to overall inequality and had an increasing marginal effect on it. Their finding is inconsistent with that of Tran (2016), which showed that forest income accounts for a small share of overall inequality and has a reducing marginal effect on it.

Holding more productive assets (forestland and croplands) was found to have an indirect positive effect on inequality, via its positive effect on household income among rural households in the North Central Region of Vietnam (Nguyen and Tran 2018). A study by Sohns and Revilla Diez (2017) on three provinces in Vietnam indicates that a regionally unequal distribution of assets can increase the vulnerability to poverty of rural households, and this in turn can result in growing regional inequality. Sohns and Revilla suggest that policies for reducing poverty and inequality should focus on equalizing living conditions, notably in terms of education, and eliminating discrimination against ethnic minorities in Vietnam.

The empirical literature shows that while a substantial number of studies have examined the Gini decomposition by income source in rural and urban Vietnam, little evidence exists for ethnic population subgroups (e.g. ethnic minorities and the majority). A better understanding of how and why each income source affects income distribution within the Kinh majority and ethnic minority groups is of great importance for designing policy interventions for poverty reduction and equality in Vietnam. This gap in the literature motivates us to conduct the current study. It provides an updated analysis of long-term changes in income components which caused variation in income distribution among the ethnic majority and minorities in Vietnam over the period 2004 to 2014.

3 Data and methodology

3.1 Data

This study is based on a set of estimates of household income from the Vietnam Household Living Standard Survey (VHLSS), conducted by the General Statistics Office of Vietnam, with technical support from the World Bank and the United Nations Development Programme (UNDP). The survey covers several topics, such as employment, income, expenditure, assets, housing, education, living facilities, health, access to resources, and participation in poverty reduction programs.

The study makes use of data from 2004 to 2014.³ Six rounds of the survey were implemented during this period. The number of households each year is much the same, as seen in “Appendix 1”. The sample is dominated by Kinh people, who consistently make up more than 82%, reflecting their relative proportion of the country’s population. The study aggregates total income at the household level.

We excluded households with income in the top and bottom one percentile in each year’s data to eliminate these extreme observations. This process provides robust estimates of trends in income inequality. Although the level of inequality is slightly reduced by this trimming, overall trends and patterns remain unaffected (McCaig et al. 2009).

Total household income is the sum of six components, comprised of income from cultivation, agricultural side lines (livestock, agricultural and forestry services, hunting, trapping, domesticating wild animals, and aquaculture), nonfarm business, wages, social and government transfers, and other sources, such as remittances and assistance. Income is net revenue after expenses. All income includes cash and in-kind sources. Note that income measurement takes into account products that are both produced and consumed by households, the reason being that many ethnic minority and rural households in Vietnam are producers as well as consumers. This is also the case for rural households in developing countries (Deaton 1997).

Two groups make up Vietnam’s population: the ethnic majority (the Kinh people who consistently comprise more than 82% of the sample) and the remaining 53 ethnic minorities which make up the rest of the sample, as shown in “Appendix 1”.

3.2 Methodology

This study applies the decomposition method of the Gini coefficient, suggested by Lerman and Yitzhaki (1985). The Gini coefficient G_y can be decomposed as:

$$G_y = \sum_{i=1}^n G_i R_i S_i \quad (1)$$

where y is total income and i is income source i . The sum of all income sources i is y . G_i is the Gini of income source i and shows how equally or unequally each income source i is distributed. R_i is the Gini correlation of income source i , which is a measure of the correlation between income source i and the cumulative distribution of total income y . The Gini correlation R_i has similar properties to Pearson’s correlation coefficient and rank correlation. It ranges between -1 and $+1$. R is equal to $+1$ if an income source is an increasing function of total income, while R is equal to -1 if an income source is a decreasing function of total income. R is equal to 0 if an income source is constant, or if the income source does not contribute to the share of the Gini coefficient. S_i is the share of income source i in total income y . The sum of S_i equals one.

Using this method provides information on the effect of changes in a particular income source i on overall income inequality. The following is the formula for the partial derivative of the overall Gini with respect to a percentage change (e) in income source i :

³ We do not use the 2002 data as its sample size is much larger (about 30,000 households) and consists of more observations of poorer households, making it less comparable to other waves of the VHLSS from 2004 to 2014 (Doan et al. 2017).

$$\delta G_y / \delta e_i = G_i R_i S_i - G_y S_i = S_i (G_i R_i - G_y) \quad (2)$$

Equation (2) shows the marginal effect of the income source on overall income inequality.

To obtain percentage terms, we can divide both sides of Eq. (2) by G_y and we then get (3).

$$\left(\frac{\delta G_y}{\delta e_i} \right) \frac{1}{G_y} = \frac{G_i R_i S_i}{G_y} - S_i \quad (3)$$

Equation (3) shows that the percentage change in the Gini resulted from a small percentage change in an income source. The first component on the right-hand side of Eq. (3) is the contribution of income source i to total income inequality or the share of income inequality of income source i in overall income inequality, and the second component is the contribution of income source i to total income.

There are several advantages with this decomposition of the Gini coefficient. First, this approach is an intuitive decomposition, which allows the formation of necessary conditions for stochastic dominance. Secondly, the decomposition provides a natural interpretation of the elements making up the contribution of each income source to overall income inequality. That is, the contribution of each income source to total income inequality is the product of its own inequality (G_i), its share of total income (S_i), and its correlation with the rank of total income (R_i). Thirdly, this method allows us to examine the marginal changes in the size of an income source in overall income inequality.

The method used here, following Lerman and Yitzhaki (1985), differs from the widely used Shorrocks' decomposition (Fournier 2001), since the former applies to the Gini coefficient, while the latter focuses on the coefficient of variation. The main distinction is the sensitivity to extreme values of the coefficient of variation compared to the Gini. However, both methods provide relatively similar values and directions for most of the variables (Rani and Furrer 2016).

4 Empirical analysis

This section analyses the Gini index decomposition by income source from 2004 to 2014 in Vietnam, using the VHLSS data. The results show the contribution of each income component to total income, to overall income inequality, and to relative income inequality. But before carrying out the analysis, we provide an overview of income changes between 2004 and 2014.

4.1 Changes in average per capita income between 2004 and 2014

This section discusses changes in average real per capita income in Vietnam between 2004 and 2014 for the ethnic majority and minority sub-populations.

Figure 1 shows average per capita income from 2004 to 2014 in real terms in 2010, using the VHLSS 2004–2014. At first glance, real income per capita grew for both groups. However, the income of the ethnic majority (Kinh) group increased more rapidly than that of the ethnic minorities. Notably, in any given year, the majority always had a much higher mean income than the minority. In 2004, for example, the average

Fig. 1 Average real income per capita (in thousands of VND), 2004–2014. *Note:* Exchange rates (USD/VND) were 15,560 in 2004 and 21,189 in 2014. *Data source:* VHLSS 2004–2014

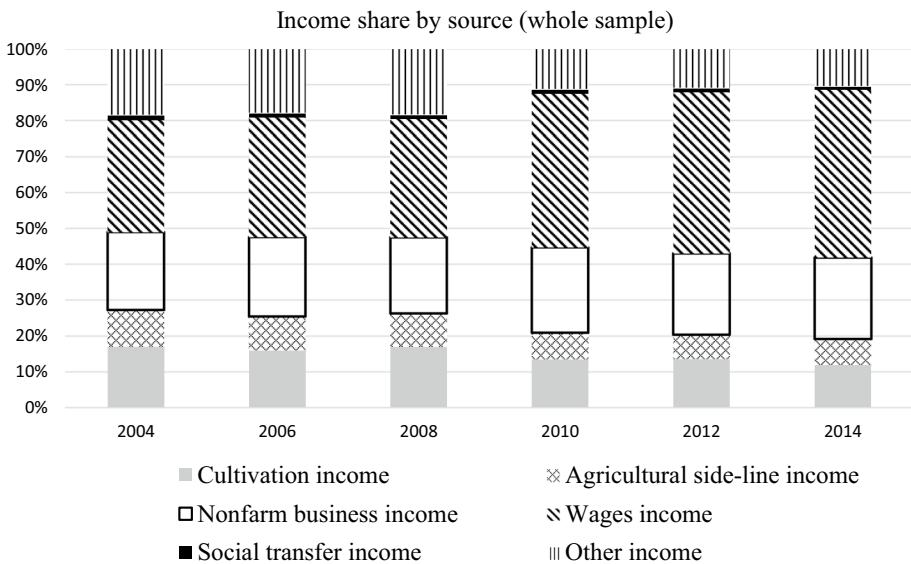
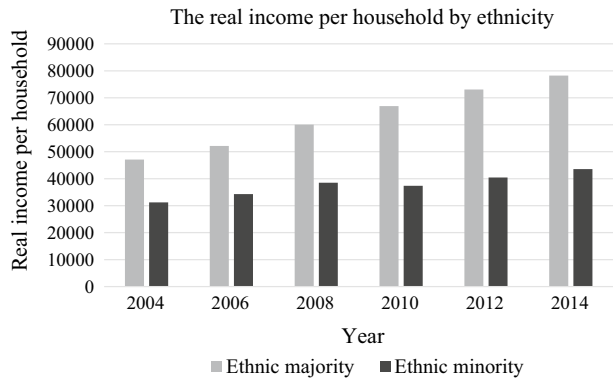
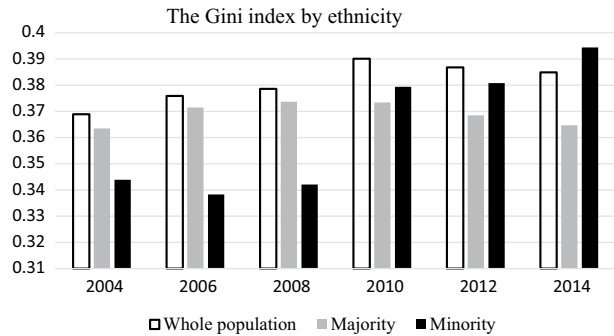


Fig. 2 Contribution of income sources to total household income. *Source:* VHLSS 2004–2014

annual real income per household for the ethnic majority and minority groups was about VND 47.1 million and VND 31.2 million, respectively. In 2014, these values were VND 78.2 million and VND 43.6 million. The relative income gap between the two groups widened from 1.5 times to 1.8 times over the 10-year period.

In addition, between 2004 and 2014, the income growth rate of the richest group was much higher than that of the poorest group. Our estimates show that over the past 10 years, the annual incomes of the 10% lowest income households increased 12 times from VND 10,890,470 in 2004 to VND 134,901,230 in 2014, whereas household income for the top 10% income percentile climbed 16 times more rapidly, from VND 121,745,300 to VND 1929,227,200. Consequently, the income gap between the top 10 and bottom 10 percentile households widened. In 2004, the gap was 6.1 times but was 7.3 times in 2014.

Fig. 3 Gini index by ethnicity

4.2 Change in income structure from 2004 to 2014

Figure 2 presents the change that took place during the study period in the structure of income inequality by income sources. Income from the agricultural sector shrank relative to non-agricultural income. Among the six income categories, wage and salary income accounted for the largest proportion, followed by nonfarm business income, which included revenue from cultivation, agricultural side lines, other income, and social transfers. The contribution of wages to total household income grew rapidly, from 30% in 2004 to 46% in 2014.⁴

Although the wage portion increased significantly, its share in total household income in Vietnam remains smaller than in several other developing countries. According to the Global Wage Report 2014/2015 (ILO 2014), wage income contributes up to 60% of total household income in developing countries (Fig. 3).

The second largest income source is nonfarm activities, such as manufacturing, mining, and income from renting out a house or residential areas. The contribution from these incomes has been stable, at about 20% for the study period. The share of income from other sources, such as overseas and domestic remittances and gifts, decreased dramatically, and the share of income from cultivation also declined from 19% in 2004 to 14% in 2014. The contribution of other income sources declined from 18 to 10%. The changes in income structure in Vietnam over the 10-year period reflect the transformation of the economy towards less reliance on agriculture. It should be noted that while all income sources show an increase or decline in their shares of total income, their absolute values increased over the 2004–2014 period.

Table 1 shows that the changes in income structure vary across ethnic groups. The ethnic majority experienced a sharp decrease in income from cultivation, agricultural side lines, social and government transfers, and other sources. At the same time, the ethnic minorities were more reliant on agricultural income than the Kinh people. Besides cultivation income, ethnic minorities also earned a larger proportion of their income from agricultural side lines and transfers for education and health care than did the ethnic majority. Ethnic minority groups also receive a smaller proportion of their income from wages, nonfarm earnings, and other income components. The ethnic majority receive three times

⁴ Nominal income by source across the years can be seen in “Appendix 2”.

Table 1 Household income structure by ethnicity (%)

Years	Cultivation income	Agricultural side-line income	Nonfarm business income	Wages income	Social transfer income	Other income
<i>Majority</i>						
2004	0.169	0.104	0.216	0.314	0.013	0.184
2006	0.159	0.096	0.221	0.335	0.011	0.178
2008	0.169	0.094	0.212	0.331	0.011	0.183
2010	0.134	0.076	0.237	0.430	0.011	0.112
2012	0.134	0.070	0.226	0.452	0.011	0.108
2014	0.118	0.074	0.226	0.470	0.009	0.103
<i>Minorities</i>						
2004	0.364	0.205	0.092	0.207	0.015	0.117
2006	0.328	0.185	0.104	0.235	0.014	0.134
2008	0.376	0.183	0.072	0.236	0.016	0.118
2010	0.134	0.076	0.237	0.430	0.011	0.112
2012	0.314	0.150	0.099	0.339	0.018	0.080
2014	0.279	0.142	0.081	0.403	0.021	0.074

more nonfarm earnings than the minority, although the wage income of the ethnic minority group has doubled during the 10-year study period.

In summary, all ethnic groups have derived an increasing portion of their income from wages. However, the growth rate of wage income for the ethnic minorities has been faster than for the ethnic majority group. Income from the agricultural sector still played a significant role for all ethnic groups, despite its decreasing contribution to total household income.

4.3 The Gini index trend, 2004–2014

This section discusses the Gini coefficient and how it changed over the period, and the changes in income structure in Vietnam.

The Gini index in Vietnam has changed its direction, with an uphill trend evident before 2010 and a downhill trend after 2010. The Gini coefficient calculated for the ethnic majority shows a similar trend. In contrast, the Gini calculated for the ethnic minorities increased constantly over the same period.

In 2004, Vietnam's Gini index was 0.369. It then reached a peak of 0.390 in 2010, before declining to 0.385 in 2014. Up to 2012, the Gini index calculated for the population was always higher than the Gini for each ethnic group. The Gini index for ethnic minorities increased considerably from 0.344 in 2004 to 0.394 in 2014. In contrast, the Gini index for the ethnic majority group remained almost unchanged at about 0.364 over the same period. The Gini index for Vietnam's general population declined after 2010, but has increased for the ethnic minority group. In 2014, the Gini coefficient for the minorities reached the highest level ever observed during the study period. This might reflect increasing income disparity within ethnic minority households for different ethnicities in Vietnam.

Table 2 Gini index of each income source by ethnicity

Years	Cultivation income	Agricultural side-line income	Nonfarm business income	Wages income	Social transfer income	Other income
<i>Majority</i>						
2004	0.682	0.768	0.792	0.684	0.889	0.723
2006	0.710	0.796	0.795	0.674	0.874	0.722
2008	0.726	0.804	0.808	0.678	0.865	0.721
2010	0.771	0.853	0.804	0.624	0.887	0.757
2012	0.795	0.857	0.812	0.613	0.881	0.724
2014	0.804	0.866	0.810	0.603	0.908	0.722
<i>Minorities</i>						
2004	0.454	0.494	0.922	0.762	0.835	0.785
2006	0.470	0.506	0.920	0.741	0.818	0.768
2008	0.473	0.527	0.920	0.747	0.821	0.796
2010	0.511	0.577	0.929	0.729	0.827	0.789
2012	0.535	0.564	0.932	0.712	0.748	0.770
2014	0.537	0.574	0.934	0.716	0.811	0.812

Table 3 The correlation coefficient between income source and the distribution of total income

Years	Cultivation income	Agricultural side-line income	Nonfarm business income	Wages income	Social transfer income	Other income
<i>Majority</i>						
2004	0.250	0.344	0.595	0.587	0.324	0.568
2006	0.289	0.335	0.603	0.607	0.288	0.525
2008	0.328	0.594	0.602	0.225	0.508	0.507
2010	0.299	0.321	0.618	0.622	0.279	0.405
2012	0.351	0.302	0.601	0.628	0.239	0.343
2014	0.298	0.311	0.600	0.646	0.218	0.292
<i>Minorities</i>						
2004	0.523	0.405	0.718	0.592	0.469	0.616
2006	0.431	0.345	0.743	0.601	0.312	0.585
2008	0.500	0.419	0.644	0.627	0.382	0.586
2010	0.413	0.378	0.765	0.715	0.158	0.442
2012	0.500	0.307	0.757	0.710	0.127	0.452
2014	0.429	0.295	0.698	0.780	0.031	0.461

The Gini index calculated in this study shows a similar trend when compared to other studies but is less volatile. Benjamin et al. (2017) have shown that Vietnam's Gini index had an upward trend from 2004 to 2008, reaching its peak in 2010, but showed a downward trend between 2010 and 2014. Our Gini estimate of 0.390 is very close to the Gini

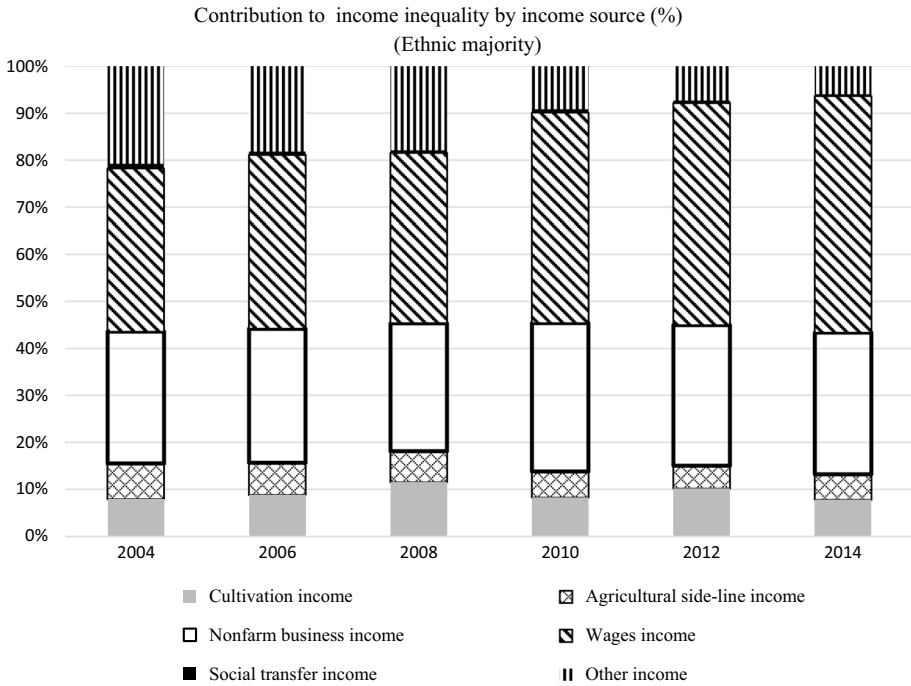


Fig. 4 Contribution of each income source to overall income inequality for the ethnic majority population

index calculated by Benjamin et al. (2017) at 0.396.⁵ However, the trend is consistent across these studies.

Table 2 reports Gini index estimates for each income source by ethnicity for the 2004–2014 period. It shows that for the ethnic minority group, cultivation and agricultural side-line incomes were much more equally distributed than were other income sources, because the overwhelming majority of households participated in these activities. The Gini index of wage income suggests that wage income was evenly distributed and showed a slight downward trend for both groups over the 2004–2014 period. By contrast, other income sources (nonfarm, social transfer and other incomes) were very unevenly distributed and tended to increase slightly or remain stable over the same period for both groups.

Table 3 provides information about the correlation between income source and the distribution of total household income. An income source is skewed towards those at the top of the income distribution if it has larger values of correlation coefficient. The estimates in Table 3 show that cultivation and agricultural side-line incomes and social transfer incomes flow disproportionately towards the poor, while other income sources tend to be skewed towards better-off households.

⁵ Benjamin et al. (2017) used household size as a weighting factor in estimating per capita income distribution, while our study adjusted for sampling weights. In addition, our removal of the top 1% and bottom 1% of households may result in the disparity with the other study.

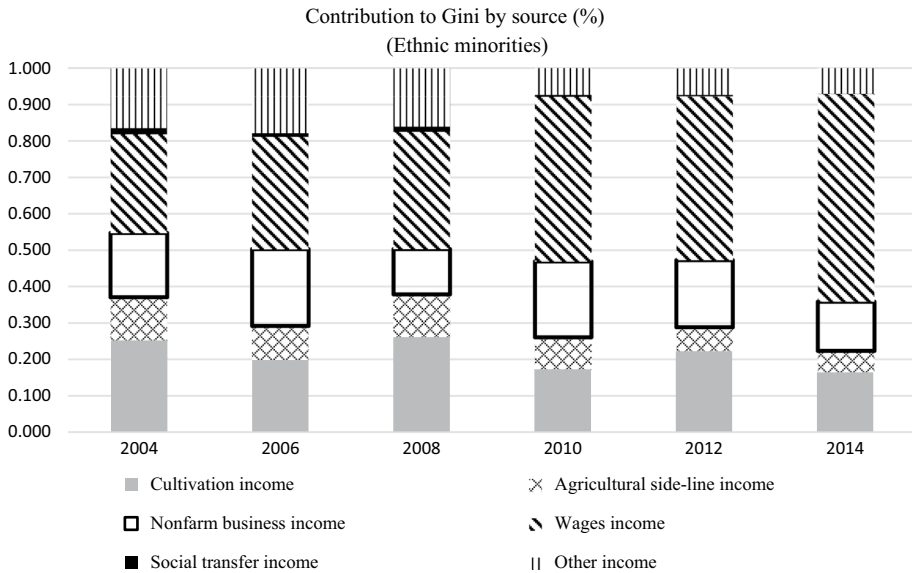


Fig. 5 Contribution of each income source to overall income inequality for the ethnic minority population

4.4 Income inequality by income sources

4.4.1 Contribution of each income source to overall inequality (Gini)

Figures 4 and 5 show that over the 2004–2014 period, wage income accounted for the largest portion of total income inequality for both ethnic majority and minority populations. In particular, the contribution of this income source increased by about 30 percentage points among the ethnic minority population, from 27% in 2004 to 57% in 2014. The corresponding figures for the ethnic majority population are about 15 percentage points. The share of other income sources in total income inequality shows a downward trend for the ethnic minority group, while nonfarm and cultivation incomes remained relatively stable between 2004 and 2014 for the ethnic majority group.

In Fig. 5, it can be seen that for the ethnic minorities, the contribution of the different income sources was greater in 2004 than it was for the ethnic majority, with the exception of transfers, which were nearly null (in both groups). By 2014, nonfarm business income was the second largest source of income inequality for the ethnic majority, accounting for about 30% of total inequality, while cultivation income made the second largest contribution to total income inequality (16.3%) for the ethnic minorities. During the 2004–2014 period, the contribution of cultivation and agricultural side-line income to overall inequality declined faster for ethnic minorities than for the ethnic majority. We also observed a rapid decline in contribution to income inequality from government transfers and other income for ethnic minorities over the same period.

4.4.2 The relative concentration coefficient

Table 4 reports estimates of the relative concentration coefficient for each income source. This is defined as a ratio of income inequality share (I) and its income share of income

Table 4 The relative concentration coefficient of income sources

Years	Cultivation income	Agricultural side-line income	Nonfarm business income	Wages income	Social transfer income	Other income
<i>Majority</i>						
2004	0.468	0.73	1.30	1.10	0.80	1.13
2006	0.552	0.72	1.29	1.10	0.68	1.02
2008	0.681	0.70	1.28	1.09	0.52	0.98
2010	0.616	0.73	1.33	1.04	0.66	0.82
2012	0.756	0.70	1.32	1.04	0.57	0.67
2014	0.657	0.74	1.33	1.07	0.54	0.58
<i>Minorities</i>						
2004	0.689	0.58	1.93	1.31	1.14	1.41
2006	0.599	0.52	2.02	1.32	0.76	1.33
2008	0.691	0.65	1.73	1.37	0.92	1.36
2010	0.556	0.57	1.87	1.37	0.34	0.92
2012	0.703	0.45	1.85	1.33	0.25	0.91
2014	0.583	0.43	1.65	1.41	0.06	0.95

source i (S_i). This analysis is needed because a large contribution to income inequality may not reflect the activity's truly disequalizing effect, since this also depends on its proportion of total income. This index is represented by the ratio between the share of income inequality (I_i) of the income source i and the share of income i in total income y (S_i). If the relative concentration coefficient of a particular income source i is greater than one, it will increase relative inequality by more than its increased income share in total income. In this case, it is termed "disequalizing". However, if the value of the relative concentration coefficient is less than one, it is called a relatively equalizing factor.

Table 4 shows that for both groups, the relative concentration coefficient from nonfarm and wage income is greater than one, while income from agricultural side lines and cultivation is smaller than one. This suggests that income from the former group increased income inequality, while income from the latter group tended to reduce income inequality. However, the value of the relative concentration coefficient for wage and nonfarm business incomes is larger for ethnic minorities than it is for the ethnic majority group. This implies that these income sources have a greater impact on increasing inequality among ethnic minorities than they do among the ethnic majority population.

Nonfarm business income had the relative concentration coefficient with the highest value, which suggests that nonfarm business income is the key driver of income inequality in Vietnam. This holds for both the ethnic majority and the minorities. Interestingly, the changes in the relative concentration coefficient for nonfarm sources followed the path of the Gini index trend. In contrast, other income and government transfer income reduced income inequality in rent years as their relative concentration coefficient declined over the study period.

4.4.3 Marginal effect of income sources on income inequality

Table 5 shows the marginal effect of income sources on overall income inequality. Income that has an equalizing effect is expected to have a negative marginal effect. For all ethnic

Table 5 Marginal effect of income sources on overall income inequality

Years	Cultivation income	Agricultural side-line income	Nonfarm business income	Wages income	Social transfer income	Other income
<i>Majority</i>						
2004	-0.090	-0.029	0.064	0.033	-0.003	0.024
2006	-0.071	-0.027	0.064	0.034	-0.004	0.003
2008	-0.054	-0.028	0.060	0.031	-0.005	-0.004
2010	-0.051	-0.020	0.078	0.017	-0.004	-0.020
2012	-0.033	-0.021	0.073	0.020	-0.005	-0.035
2014	-0.041	-0.019	0.075	0.032	-0.004	-0.043
<i>Minorities</i>						
2004	-0.113	-0.086	0.085	0.065	0.002	0.048
2006	-0.132	-0.089	0.107	0.074	-0.003	0.044
2008	-0.116	-0.065	0.053	0.087	-0.001	0.043
2010	-0.137	-0.067	0.097	0.123	-0.010	-0.007
2012	-0.093	-0.082	0.085	0.111	-0.013	-0.007
2014	-0.116	-0.081	0.053	0.167	-0.019	-0.004

groups, such income is derived from cultivation and agricultural side-line activities for all years and from social transfers and other sources for most years.

Income from cultivation and agricultural side-line activities had the greatest effect on equalizing income distribution. Whereas the effect of these income sources has declined rapidly among Kinh ethnic households, it has had a significant equalizing influence on ethnic minority households. In 2014, for example, a 1% increase in cultivation income would reduce the Gini index by 0.041% for the ethnic majority and by 0.116% for ethnic minorities.

Over time, social and government transfers for education and health care have had a greater effect on reducing income inequality, but the effect is quite small. For instance, a one per cent increase in this source would reduce the Gini index by 0.002% in 2004 but reduce it by 0.007% in 2014. Interestingly, income increased inequality before 2008 but has reduced the income gap since 2010. All ethnic groups have experienced the same trend for marginal effects, but ethnic minority households experienced a higher impact from each income source. These income sources are possible tools to narrow the income gap between households.

Conversely, the marginal effect of income from wages and nonfarm activities has clearly been positive. This indicates that these income sources increase inequality. Notably, the marginal effect from wages is five times greater for ethnic minorities than for the ethnic majority. The marginal effect of other income has undergone dramatic change from a positive value before 2008 to negative values after 2008.

For all ethnic groups, cultivation and agricultural side-line incomes have a reducing effect on overall inequality, while nonfarm business income and wage income increase inequality. This can be explained by noting that in comparison with other income sources, cultivation and agricultural side-line incomes have a much lower correlation with income distribution than do other income sources (see Table 4). In other words, the distribution of these income sources was skewed less towards the better off than was nonfarm business

and wage income. Wage income has the largest marginal effect on overall inequality among ethnic minorities, as its distribution is more unequal and favours the better off much more than other income sources do.

5 Conclusions and policy implications

This study uses the inequality decomposition method to investigate the effect of a particular income source on overall income inequality over the 2004–2014 period in Vietnam. A parallel analysis for the ethnic groups was provided for the dominant Kinh group and for all other ethnic minorities. Although Vietnam experienced an increase in the Gini index from 2004 to 2010, it decreased from 2010 to 2014. The Gini index calculated separately for Vietnam's ethnic majority shows a downward trend, while this index for its ethnic minorities revealed an upward trend.

There have been changes in income structure in Vietnam over the last decade. The portion of income from wage earnings has expanded significantly for all ethnic groups. This source accounts for half of total income for the ethnic majority (the Kinh people) and 40% for ethnic minorities. However, the portion of wage income for the ethnic minority has increased faster than for the ethnic majority.

Nonfarm business income provides the second largest share of total income for the ethnic majority group. However, this income source accounts for only about 10% of total income for ethnic minorities. The minorities depend more heavily on income from cultivation than do the majority. The other income sources contribute a relatively small proportion of the total. While the contribution of other income and agricultural side-line income has declined dramatically, social and government transfers have been stable at about one per cent. Other sources have accounted for only a small proportion of total income.

The share of total income and income inequality constituted by wage income in Vietnam grew during the study period. However, wage income was distributed more evenly, because this source has expanded more quickly for the lowest income households. This suggests that wage income has had a more equalizing effect recently.

The Gini index or overall income inequality in Vietnam is mainly explained by wages and nonfarm business income. Besides wage income, the differences in the income inequality structure between the two ethnic groups derive from differences in the contribution of crops and nonfarm business activities. While cultivation income provides a larger share of both total income and overall income inequality for ethnic minorities, it is nonfarm business income that matters more for Kinh people.

The relative income inequality for wages and nonfarm business income, which are greater than one, suggest the disequalizing effect of these sources of income. This is true for both ethnic groups. Although cultivation and agricultural side-line activities have an equalizing effect, this has decreased slightly. Other income underwent significant change in 2008, from functioning as a disequalizing source to becoming an equalizing source. Income from social transfers has reduced inequality over the last decade. This source has contributed a larger share of total household income and has become a more equalizing factor for the ethnic minorities than for the ethnic majority.

Another useful implication is that promotion of cultivation and agricultural side-line activities might increase income for those at the bottom of the distribution, especially among the ethnic minorities. The reason is that besides being an inequality-reducing source, these activities have remained a major source of income for poor and extremely

poor households. Despite the concern that agricultural growth might not offer an effective way out of poverty (Tran 2015), the results of our study suggest that by improving agricultural productivity, the poor and extremely poor can increase their income, which in turn may help reduce poverty as well as inequality.

In addition, the finding that nonfarm and wage incomes have an increasing effect on inequality should not be interpreted as something negative among ethnic minorities. Increasing inequality in this group may reflect the fact that participating in nonfarm business activities enables a number of households to escape poverty and catch up with better-off households, or at least not get poorer. This suggests that lowering the barriers faced by poor households to participation in nonfarm activities should help them move out of poverty and should reduce inequality in the study area.

Overall, the changes in income inequality in Vietnam by income sources reflect the change in the structure of the economy from reliance on agriculture to greater dependence on non-agricultural economic activities. Wage earnings have increasingly become an important source of household income. Any future studies of the structure of income inequality should focus particularly on sources of wage inequality.

In Vietnam, the gap in educational attainment has decreased since the government introduced its universal primary education policy in 2001. However, it is challenging to get children from poor rural households as well as ethnic minority households to enrol and remain in school. Sixty-five per cent of children from the ethnic majority enrol in secondary education, whereas the rate is just 13.7% for ethnic minority children. The gap in education participation is much larger at higher educational levels (Oxfam 2017). In addition, given our finding that there has been rapid change in the structure of the economy from reliance on agriculture to non-agricultural economic activities, that wage earnings have increasingly become the most important source of household income, and that the relative income inequality from wages and nonfarm business income has had an increasing effect on income inequality, it is reasonable to suggest that improving access to education for poorer children, especially children from the ethnic minorities, will enhance human capital formation and improve future job opportunities to successfully eliminate poverty.

We acknowledge that our study has some limitations. While the method applied (Gini decomposition by income source) is widely used to analyse income inequality, it does have certain constraints. First, it cannot decompose the trend in the Gini coefficient, i.e. to examine the role of income sources in change in the Gini over time. This implies that future research should deal with this issue by using a coherent method, such as that developed by Jurkatis and Strehl (2014), to decompose the Gini trend by income sources. Also, income inequality can be affected by other factors, apart from income sources, which suggests multivariate analysis should be applied in further research.

In addition, McCaig et al. (2015) noted that nonfarm self-employment incomes, and even agricultural incomes, are likely to suffer from a substantial degree of error in measurement. Unusually high income from these sources will produce a high estimate of overall income. If genuine, the Shorrocks decomposition will consider this an inequality-increasing income source. Nevertheless, if it suffers from error in measurement, the effect of this income source will be amplified, while the effect of other income sources will be diminished. Using a regression framework allows us to focus on the potential effect of measurement error on skewing the estimated contribution of an income source towards overall inequality. A natural way to account for measurement error is to use the method of instrumental variables (McCaig et al. 2015). It is often not practical to find a valid instrumental variable in most empirical studies (Wooldridge 2013), however, and this suggests

a potential focus for future studies, using the instrumental variable method for addressing measurement errors.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest in this research

Ethical approval This article does not contain any studies with human participants or animals performed by any of the authors.

Appendix 1

See Table 6.

Table 6 Summary of the VHLSS sample

	2004	2006	2008	2010	2012	2014
Households	9006	9007	9004	9214	9212	9211
Ethnic majority (%)	84.72	84.29	84.43	82.16	82.24	82.58
Ethnic minority (%)	15.28	15.71	15.57	17.84	17.76	17.42

Appendix 2

See Tables 7 and 8.

Table 7 Gini index decomposition by income source

Source (<i>i</i>)	Income share S_i	Gini G_i	Correlation with rank of total income R_i	Income inequality contribution I_i	Relative marginal effect $I_i - S_i$	Relative income inequality I_i/S_i	SE
2004							
Cultivation income	0.190	0.648	0.251	0.084	-0.106	0.441	0.004
Agricultural side-line income	0.115	0.730	0.318	0.073	-0.043	0.629	0.003
Nonfarm business income	0.203	0.813	0.623	0.278	0.075	1.369	0.005
Wage income	0.302	0.701	0.605	0.347	0.045	1.149	0.006
Social transfer income	0.013	0.883	0.345	0.011	-0.002	0.824	0.001
Other income	0.177	0.736	0.588	0.207	0.031	1.173	0.004
Total income		0.369					0.003
2006							
Cultivation income	0.177	0.674	0.272	0.086	-0.091	0.487	0.038
Agricultural side-line income	0.106	0.756	0.303	0.065	-0.041	0.610	0.041
Nonfarm business income	0.208	0.816	0.635	0.286	0.078	1.377	0.060
Wages income	0.324	0.690	0.625	0.371	0.047	1.146	0.006
Social transfer income	0.012	0.867	0.291	0.008	-0.004	0.672	0.001
Other income	0.173	0.732	0.544	0.184	0.010	1.059	0.004
Total income		0.376					0.002
2008							
Cultivation income	0.191	0.688	0.325	0.113	-0.078	0.592	0.050
Agricultural side-line income	0.104	0.776	0.309	0.065	-0.039	0.625	0.003
Nonfarm business income	0.197	0.828	0.621	0.268	0.070	1.357	0.006
Wages income	0.321	0.694	0.622	0.366	0.045	1.140	0.006
Social transfer income	0.011	0.859	0.246	0.006	-0.005	0.558	0.001
Other income	0.176	0.736	0.533	0.182	0.006	1.036	0.005
Total income		0.379					0.003

Table 7 (continued)

Source (<i>i</i>)	Income share S_i	Gini G_i	Correlation with rank of total income R_i	Income inequality contribution I_i	Relative marginal effect $I_i - S_i$	Relative income inequality I_i/S_i	SE
<i>2010</i>							
Cultivation income	0.153	0.729	0.264	0.075	-0.077	0.493	0.004
Agricultural side-line income	0.085	0.813	0.295	0.052	-0.033	0.615	0.003
Nonfarm business income	0.224	0.828	0.660	0.313	0.089	1.400	0.006
Wages income	0.419	0.649	0.659	0.459	0.040	1.096	0.001
Social transfer income	0.012	0.879	0.264	0.007	-0.005	0.598	0.001
Other income	0.108	0.768	0.437	0.093	-0.015	0.861	0.003
Total income		0.390			0.000		0.002
<i>2012</i>							
Cultivation income	0.154	0.754	0.323	0.097	-0.057	0.630	0.005
Agricultural side-line income	0.078	0.816	0.261	0.403	0.025	5.142	0.003
Nonfarm business income	0.212	0.835	0.644	0.295	0.083	1.390	0.005
Wages income	0.440	0.638	0.664	0.481	0.042	1.095	0.006
Social transfer income	0.011	0.863	0.214	0.006	-0.006	0.482	0.001
Other income	0.105	0.739	0.391	0.078	-0.027	0.746	0.003
Total income		0.387					0.002
<i>2014</i>							
Cultivation income	0.135	0.762	0.269	0.072	-0.063	0.533	0.005
Agricultural side-line income	0.081	0.828	0.277	0.048	-0.033	0.594	0.003
Nonfarm business income	0.211	0.833	0.639	0.292	0.081	1.383	0.005
Wages income	0.463	0.628	0.686	0.518	0.055	1.118	0.007
Social transfer income	0.010	0.892	0.131	0.003	-0.007	0.309	0.001
Other income	0.100	0.742	0.349	0.067	-0.033	0.672	0.003
Total income		0.385					0.002

Table 8 Average income per household and income component by ethnicity (in thousands of VND)

	Total income	Cultivation income	Agricultural side-line income	Nonfarm business income	Wages income	Social transfer income	Other income
<i>2004</i>							
Population	24,704.2	4695.9	2845.5	5271.1	7464.3	64.85	4362.6
Majority	26,065.5	4402.6	2717.3	5900.0	8178.7	74.65	4792.3
Minority	17,278.3	6296.0	3544.6	1840.4	3567.5	11.40	2018.3
<i>2006</i>							
Population	31,733.7	5629.1	3365.5	6811.3	10,277.0	152.75	5498.0
Majority	33,565.3	5322.6	3230.6	7613.7	11,244.0	176.47	5978.0
Minority	22,070.4	7246.0	4077.6	2578.3	5174.9	27.62	2966.0
<i>2008</i>							
Population	48,604.7	9269.6	5047.1	9909.7	15,609.1	217.02	8552.1
Majority	51,508.9	8681.3	4860.0	11,225.3	17,069.7	249.30	9423.3
Minority	33,056.4	12,419.1	6048.5	2866.8	7789.4	44.20	3888.4
<i>2010</i>							
Population	61,615.0	9401.7	5215.6	14,180.5	25,825.0	322.05	6670.2
Majority	66,911.9	8942.5	5077.9	16,273.0	28,774.4	366.95	7477.2
Minority	37,354.2	11,504.9	5846.3	4596.3	12,316.2	116.40	2974.1
<i>2012</i>							
Population	87,045.3	13,370.0	6826.9	19,116.4	38,254.1	359.73	9118.3
Majority	94,623.9	12,694.4	6605.2	21,986.0	42,733.2	408.47	10,196.6
Minority	52,367.8	16,461.0	7840.9	5986.1	17,758.9	136.68	4184.3
<i>2014</i>							
Population	103,634.2	14,023.0	8400.6	22,450.4	47,992.0	425.96	10,342.2
Majority	112,399.2	13,293.1	8293.7	25,891.3	52,850.5	506.19	11,564.6
Minority	62,568.3	17,443.0	8901.6	6329.5	25,228.9	50.37	4615.0

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