Received 7 October 2022
Revised 15 January 2023
Accepted 1 March 2023

Consumption inequality between farm and non-farm households in rural Vietnam

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Abstract

Purpose – This study aims to analyse the consumption inequality between farm and non-farm households in rural Vietnam, using the data from the 2016 Vietnam household living standards survey.

Design/methodology/approach – The present paper applies the "recentered influence functions (RIF)" in "Oaxaca-Blinder (OB)" type decomposition as proposed by Firpo *et al.* (2018) to allow for the flexible distribution of the outcome variables and the non-randomness of non-farm employment that violates the classical linearity assumption.

Findings – Non-farm households have significantly higher per capita consumption expenditure than farm households for the entire distribution. The gap in expenditure is large at low percentiles and narrowing with higher percentiles. At 10th percentile, the gap is estimated at 27.1%, but it is decreasing to 11.1% at 90th percentile. Most of the gaps are explained by the differences in the observed characteristics between farm and non-farm households such as ethnicity, education, income, internal transmittances and household composition. Non-farm households are endowed with more productive factors that result in higher per capita consumption expenditure.

Originality/value – Gaps in ethnicity and education are found to be key predictors of the inequality in consumption expenditures between farm and non-farm households, then, government policies that are aimed at increasing access to non-farm employment and education for ethnic minorities and for rural poor households are pathways to improve rural household welfare and hence reduce inequality.

Keywords Consumption inequality, Non-farm household, Oaxaca-blinder decomposition, Rural Vietnam

Paper type Research paper

1. Introduction

The importance of non-farm activities has been increasing in the rural developing countries over the past decades. Rigg (2006) observes lives and livelihoods in the Rural South and reports that non-farm activities are becoming central to rural livelihoods and hence, agricultural development is no longer the best instrument for generating rural income and improving livelihoods. This phenomenon is not an exception in rural Vietnam. During the period from 1993 to 2016, the share of non-farm income of rural households has steadily risen

JEL Classification — C18, C21, D31, I31

Journal of Asian Business and Economic Studies
Vol. 31 No. 4, 2024
pp. 290-306
Emerald Publishing Limited
2515-964X
DOI 10.1108/JABES-09-2022-0224

from nearly 48% to around 73% while the average growth rate of income per capita is estimated at 7.4% per annum (GSO, 1994, 2018). Hoang *et al.* (2014), Imai *et al.* (2015) and Newman and Kinghan (2015) well document that non-farm employment increases rural per capita consumption expenditure and that households with skilled employment are likely to enjoy more benefits from the non-farm sector. These evidences confirm that non-farm activities are becoming main driver of poverty reduction and wealth improvement in rural Vietnam.

In addition to positive impacts on wealth, non-farm employment has potentials to increase inequality among rural households due to the gaps in endowment access to such activities across rural households in developing countries (Lanjouw and Lanjouw, 2001; Himanshu *et al.*, 2013). Reardon *et al.* (2000), by reviewing household survey evidence from Africa, Asia and Latin America, assert that the impacts of non-farm employment on rural income inequality are mixed. More recently, Gutema (2019) and Howell (2017) have well documented the positive impacts of non-farm income on rural inequality in Ethiopia and, China, respectively. However, little is known about the sources of inequality between farm and non-farm households. To our knowledge, Chang (2012) may be the only one to decompose the disparity in household consumption to investigate the sources of the disparity between farm and non-farm households in rural Taiwan.

The present paper contributes to the literature by estimating the gap in household per capita consumption expenditure for the entire distribution and examining how the households' socio-economic characteristics explain the inequality between farm and non-farm households in rural Vietnam. The paper is relevant to Vietnam where the rural economy is generally characterized by small-scale production, rice-dominant farming and hence, low income (FAO, 2018) and non-farm employment is found to be a key livelihood strategy for poverty alleviation and welfare improvement (Ravallion and Van De Walle, 2006, 2008; Hoang *et al.*, 2014). Better understanding of the sources of the inequality help design effective agricultural policies that are aimed at improving the welfare of rural households.

Using the data of the Vietnam household living standards survey (VHLSS) in 2016, we apply the two-stage decomposition approach proposed by Firpo *et al.* (2018) to decompose the differences in the entire distribution of consumption expenditures between farm and non-farm households into endowment effects and coefficient effects. We find that non-farm households have significantly higher per capita consumption expenditure than farm households do for the entire distribution. The gap in expenditure is large at low percentiles and narrowing with higher percentiles. At 10th percentile, the gap is estimated at 27.1%, but it is decreasing to 11.1% at 90th percentile. Most of the expenditure gaps are explained by the differences in the observed characteristics between farm and non-farm households. Coefficient effect of education is also noteworthy. Non-farm households are endowed with more productive factors in terms of ethnicity, education, income, internal transmittances and household composition that result in higher per capita consumption expenditure.

The paper proceeds as follows. Section 2 summarizes the Vietnamese contextual background of the non-farm diversification that is relevant for understanding the inequality between household groups. Section 3 details the econometric method while section 4 describes the data. Section 5 presents the empirical results and section 6 concludes.

2. The Vietnamese context

Agriculture plays an important role in the Vietnamese economy and so land policy is crucial for the development of Vietnam. Before 1980s, all agricultural land was assigned to cooperatives to promote large-scale production and to ensure resource allocation in production and distribution aligned with targets set by the State Planning Committee (Kirk and Tuan, 2009). The 1988 Land Law assigned agricultural land to individual

households with 10–20 years of secure land use right. Individual household farm was now recognized the main unit of agricultural production. However, land use and crop choice decisions were still controlled by the state.

Subsequent revisions of the land law in 1993, 1998 and 2001 have recognized five rights of inheritance, transfer, exchange, lease and mortgage. Land use could be changed as long as they were registered with the local authorities (Do and Iyer, 2008). Granting more land titles to households and increased security of tenure could promote households to devote more time to non-farm activities (Do and Iyer, 2008). Ravallion and Van De Walle (2006) found that households with too small land were likely to sell or transfer their land or to participate in non-farm activities. As a result, land has been re-allocated to households who are more productive in agricultural production (Akram-Lodhi, 2005; Ravallion and Van De Walle, 2006, 2008). Then, land consolidation is proved to increase rural household income but it also entails the divergence in farm size across households (Van Phan and O'Brien, 2022). In addition, land acquisition due to rapid industrialization and urbanization in the past decades may also drive farmers out of traditional agricultural activities to diversifying into non-agricultural sectors (Ravallion and Van De Walle, 2008).

During 1993–2008, the proportion of households engaged in non-farm economy increased from 16.5% to 34% (Hoang *et al.*, 2014). Diversification into non-farm activities significantly not only increases rural household living standards (Imai *et al.*, 2015; Hoang *et al.*, 2014) but may also increases inequality. Households with more favourable socio-economic conditions are more likely to participate in high-return activities while poorer households partake in low-return activities (Newman and Kinghan, 2015).

3. Estimation method

We apply the decomposition method proposed by Firpo *et al.* (2018), also known as Firpo, Fortin & Lemieux (FFL). It is an extension to the well-known OB method that relies on recentered influence functions (RIF) regression. The method involves a two-stage procedure of estimation. The first stage identifies determinants of real household expenditure at the mean and selected quantiles for both farm and non-farm groups, using the unconditional quantile regression (UQR). The second stage decomposes the expenditure gap into endowment effect and coefficient effect.

3.1 Decomposition method

The conventional OB decomposition method decomposes the differences in the mean outcome variable into endowment effect and coefficient effect and then, divides these effects into the contribution of each covariate. The standard OB decomposition based on a linear function can be given as:

$$Y_{ti} = \boldsymbol{X}_{\boldsymbol{i}}'\boldsymbol{\beta}_{\boldsymbol{t}} + \varepsilon_{ti} \text{ (for } t = 0;\ 1 \text{ and } \mathbb{E}[\varepsilon_{ti}|X_i,\ T = t] = 0) \tag{1}$$

where Y_{ti} is the outcome variable of individual i belonging to group t, $\boldsymbol{X}$ is a vector of covariates that determine household expenditures, vector $\boldsymbol{\beta}$ contains unknown parameters and ε is the random error. Then, the difference in mean of Y between the two groups is as follows:

$$\begin{aligned}\Delta_O^{\mu} &= \mathbb{E}[Y|T=1] - \mathbb{E}[Y|T=0] \\ &= \underbrace{E[X|T=1]'(\beta_1 - \beta_0)}_{\Delta_S^{\mu}} + \underbrace{(\mathbb{E}[X|T=1] - \mathbb{E}[X|T=0])'\beta_0}_{\Delta_X^{\mu}}\end{aligned} \tag{2}$$

The first term in equation (2), Δ_S^{μ}, is the coefficient effect, representing the differentials of marginal effect of the covariates while the second term, Δ_X^{μ}, represents the endowment

effect. By summing up the effects over covariates in model (1), the two terms can be re-written as:

$$\Delta_S^{\mu} = \sum_{k=1}^{k} \mathbb{E}\left[X^k \middle| T = 1\right]' (\beta_{1,k} - \beta_{0,k}) \tag{3}$$

$$\Delta_X^{\mu} = \sum_{k=1}^{k} \left[\mathbb{E}\left[X^k \middle| T = 1\right] - \mathbb{E}\left[X^k \middle| T = 0\right]\right]' \beta_{0,k} \tag{4}$$

where X^k and $\beta_{t,k}$ is kth element of $\mathbf{X}$ and $\boldsymbol{\beta}$, respectively. Under the linear assumption, estimating the components of the OB model is very simple by replacing parameter vectors $\boldsymbol{\beta}$ with their ordinary least squares (OLS) estimates, and replacing the expected value $\mathbb{E}[X|T = t]$ with the sample averages. However, estimates from OB model are consistent only under the linear assumption of the conditional expectation of the outcome variable (Barsky *et al.*, 2002). Further, the OB method focuses only on the differences in the mean outcomes. To solve for the non-linear problem as well as to account for the differences in the overall shape of the outcome distribution, Firpo *et al.* (2018) introduced an extension of OB model that is based on reweighting approach proposed by DiNardo *et al.* (1996) in combination with RIF regression. We briefly present the notion of the RIF below.

Consider some distributional statistic of the outcome, $v(F)$, say, the median or any quantile. The "*influence function*", $\text{IF}(y; v, F)$, represents the influence of a certain individual on the distributional statistic, $v(F)$. Adding up $v(F)$ with IF, we get RIF:

$$\text{RIF}(y; v, F) = v(F) + \text{IF}(y; v, F) \tag{5}$$

Since the expected value of the IF is zero, then, the expected value of the RIF is exactly equal to the value function, $v(F)$. As the conditional expectation of the RIF is expressed as a function of the explanatory variables, $\mathbb{E}[RIF(Y; v, F)|X] = m_v(X)$, we get a regression model of the RIF. Firpo *et al.* (2018) define that the regression function of $m_v(X)$ as the UQR model and they prove that the regression of a particular statistic produce the same coefficients as estimates from OLS. Then, using RIF regression for OB decomposition provides a linear approximation for non-linear functions of a certain quantile. For simplicity, the linear representation of the RIF regression (also known as RIF-OLS) is used when decomposing the OB model at the quantile q_τ (for detailed discussions, see Firpo *et al.* (2018)). The process of FFL decomposition involves two stages. The first stage estimates the endowment effect and coefficient effect based on the estimated coefficients from the RIF regression of the quantile q_τ. Now, the two effect components take the form:

$$\Delta_X^{q_\tau} = (\mathbb{E}[X|T = 1] - \mathbb{E}[X|T = 0])' \gamma_0^{q_\tau} + R^{q_\tau} \tag{6}$$

$$\Delta_S^{q_\tau} = \mathbb{E}[X|T = 1]' (\gamma_1^{q_\tau} - \gamma_C^{q_\tau}) \tag{7}$$

where $\Delta_X^{q_\tau}$ is the endowment effect at a certain quantile q^τ, similar to the one in the standard OB model, but it is added to an approximation error (also called specification error), R^{q_τ}, from the RIF regression that is linked to the fact that the FFL regression provides only a *first-order approximation* to the endowment effect [1]. The specification error represents the difference between the endowment effect estimated by reweighting approach and the one estimated by the standard OB method. For the coefficient effect, instead of using parameter $\gamma_0^{q_\tau}$ as in the standard OB model, the FFL method uses the counterfactual, $\gamma_C^{q_\tau}$, of the regression coefficient of group 1. The counterfactual coefficient is obtained by reweighting the group 0 data to have the same distribution of X as group 1. By using the difference, $(\gamma_1^{q_\tau} - \gamma_C^{q_\tau})$, instead of $(\gamma_1^{q_\tau} - \gamma_0^{q_\tau})$,

the estimates of the coefficient effect are able to eliminate confounding errors caused by differences in the distribution of X between the two groups (Firpo *et al.*, 2018).

The second stage decomposes the two effects into the contribution of each covariate. By using UQR, the regression coefficients of $\gamma_t^{q_\tau}$ and $\gamma_C^{q_\tau}$ are given by (see Firpo *et al.* (2018) for detailed proof):

$$\widehat{\gamma}_t^{q_\tau} = \left(\sum_{i=1}^{N} \widehat{\omega}_t^*(T_i) X_i X_i' \right)^{-1} \cdot \sum_{i=1}^{N} \widehat{\omega}_t^*(T_i) X_i \widehat{RIF}(Y_i;\, q_\tau, F_t), t = 0;\, 1 \tag{8}$$

$$\widehat{\gamma}_C^{q_\tau} = \left(\sum_{i=1}^{N} \widehat{\omega}_C^*(T_i, X_i) X_i X_i' \right)^{-1} \cdot \sum_{i=1}^{N} \widehat{\omega}_C^*(T_i, X_i) X_i \widehat{RIF}(Y_i;\, q_\tau, F_C) \tag{9}$$

Then, the endowment effect and coefficient effect of each covariate on a selected distributional statistic are decomposed as:

$$\widehat{\Delta}_S^{q_\tau} = \left(\sum_{i=1}^{N} \widehat{\omega}_0^*(T_i) X_i \right)' \left(\widehat{\gamma}_1^{q_\tau} - \widehat{\gamma}_C^{q_\tau} \right) \tag{10}$$

$$\widehat{\Delta}_X^{q_\tau} = \left(\sum_{i=1}^{N} \left(\widehat{\omega}_1^*(T_i) - \widehat{\omega}_0^*(T_i) \right) X_i \right)' \widehat{\gamma}_0^{q_\tau} + \widehat{R}^{q_\tau} \tag{11}$$

where $\widehat{R}^{q_\tau} = (\sum_{i=1}^{N} \widehat{\omega}_1^*(T_i) X_i)' (\widehat{\gamma}_C^{q_\tau} - \widehat{\gamma}_0^{q_\tau})$ is an estimate of the approximation error.

3.2 Model specification

To examine the expenditure inequality at mean and selected quantiles, we apply UQR estimates for the RIF whose outcome variable is the logarithm form of household consumption expenditure per capita. Consumption expenditure has been proposed as a more reliable welfare indicator relative to household income in several ways. Cutler and Katz (1992) and Slesnick (2001) argue that not all is income spent on material goods and services that produce life satisfaction. Moreover, consumption is more smoothing than income. Deaton (1997) also notes that household income is often under-reported. For agricultural households, income is highly variable.

The determinants of consumption expenditure include a set of variables representing demographic characteristics (household size, dependency ratio, ethnicity, age and education of household head), socio-economic characteristics (household income, remittances within country and remittances from oversea) (Chang, 2012; Thu Le and Booth, 2014) and a set of regional dummies to capture the regional differences in expenditure [2]. The linear form of RIF on household consumption expenditure at selected quantiles, τ, takes the following form:

$$\text{RIF}(Y_{t,i};\, q_\tau, F) = \mathbf{X_{t,i}} \boldsymbol{\gamma_t} + \varepsilon_t, t = 0;\, 1 \tag{12}$$

where, $Y_{t,i}$ is the logarithm form of the real consumption expenditure per capita the household i in group t ($t = 1$ representing non-farm households, $t = 0$ for farm households); $\mathbf{X}_{t,i}$ is the vector of covariates representing household demographic and socio-economic characteristics; $\boldsymbol{\gamma_t}$ is the vector of RIF regression coefficients; and ε_t is the error term. The RIF coefficients are, then, estimated at mean and at 10th, 25th, 50th and 90th percentile using UQR to explore the inequality between household groups for the entire distribution of consumption expenditure. Then, the expenditure gap between the two household groups from the extension of OB model at quantile q_τ takes the following form:

$$\widehat{\Delta}_O^{q_\tau} = \left[\left(\overline{X}_1^C - \overline{X}_1\right)'\widehat{\gamma}_1^{q_\tau}\right] + \left[\overline{X}_1^{C\prime}\left(\widehat{\gamma}_C^{q_\tau} - \widehat{\gamma}_1^{q_\tau}\right)\right] + \left[\overline{X}_0{}'\left(\widehat{\gamma}_0^{q_\tau} - \widehat{\gamma}_C^{q_\tau}\right)\right] + \left[\left(\overline{X}_0 - \overline{X}_1^C\right)'\widehat{\gamma}_C^{q_\tau}\right]$$
$$= \widehat{\Delta}_{X,p}^{q_\tau} + \widehat{\Delta}_{X,e}^{q_\tau} + \widehat{\Delta}_{S,p}^{q_\tau} + \widehat{\Delta}_{S,e}^{q_\tau} \quad (13)$$

where $\overline{X}_0$ and $\overline{X}_1$ are vectors of the mean of observed characteristics of non-farm and farm households, respectively; $\widehat{\gamma}_0^{q_\tau}$ and $\widehat{\gamma}_1^{q_\tau}$ correspond to the vectors of estimated coefficients of each separate regression function of the non-farm and farm households group on each quantile; $\overline{X}_1^C$ and $\widehat{\gamma}_C^{q_\tau}$ are vectors of the mean characteristics of the counterfactual of the non-farm households and of estimated counterfactual coefficients obtained by reweighting the data of group 0 so that it has the same distribution as of group 1, respectively; $\widehat{\Delta}_{X,p}^{q_\tau}$ and $\widehat{\Delta}_{X,e}^{q_\tau}$ are endowment effects and specification error used to check whether the linear assumption holds. The component of coefficient effect is converted to $\widehat{\Delta}_{S,p}^{q_\tau}$ and $\widehat{\Delta}_{S,e}^{q_\tau}$, where $\widehat{\Delta}_{S,p}^{q_\tau}$ is the coefficient effect similar to the one in the standard OB model, and $\widehat{\Delta}_{S,e}^{q_\tau}$ is the reweighting error, approaching 0 in large sample (Firpo *et al.*, 2018).

4. Data, variables and descriptive statistics

4.1 Data

We use the data from the VHLSS in 2016. VHLSSs are nationally representative surveys conducted by the general statistics office (GSO) with technical assistance of the World Bank in every two years. Sampled households are randomly selected by a three-stage stratified sampling method. First, communes are randomly selected from the listed "enumeration areas (EA)" of the 2009 population census so that the sampled communes spread over all provinces. The communes are stratified on province and urban/rural areas proportional to the number of households. Second, 3 enumeration areas per commune are randomly selected. And third, sampled households in each EA are randomly selected based on the updated list of households in the EAs. VHLSSs collect rich data of several aspects of household living standards, including income and expenditures, individual demographics, education, health, employment, migration, household business, expenditures and incomes, and credit and savings. The 2016 VHLSS covers 9,399 households. Out of them 6,570 households are located in rural areas.

Based on the composition of household income, 1,900 households (28.9%) are classified as farm households and the rest 4,670 households are non-farm ones. The classification complies with the instructions of the Vietnamese GSO which defines households of a certain type according to the income-generating activity that brings the greater part in total income. The present study defines farm households as those whose income from farming activities is greater than half of total household income and non-farm households are, otherwise.

4.2 Descriptive statistics of key variables

Definitions and descriptive statistics of variables in the analysis are presented in Table 1. The mean per capita income from economic activities and expenditure of non-farm households are well above those of the counterparts. Regarding the demographic characteristics, the mean age and years of schooling of the non-farm household heads is somewhat higher than those of the farm household ones. The non-farm households have relatively smaller household size though their total dependency ratio (both under 15 and

Variable	Description	Farm household Mean	Farm household Standard deviation	Non-farm household Mean	Non-farm household Standard deviation
pce	Per capita expenditure (1,000 VND/year)	18,371	16,410	21,191	15,312
Household heads' characteristics					
age	Age of household head	48.96	13.00	52.24	14.49
ethnic	Kinh ethnicity = 0; others = 1	0.40	0.49	0.15	0.36
educ	Years of schooling of head	6.10	3.61	7.20	3.89
Households' characteristics					
hhsize	Household size	4.01	1.65	3.75	1.58
dep15	Ratio of household members under 15	0.22	0.21	0.20	0.21
dep65	Ratio of household members over 65	0.08	0.20	0.13	0.28
Socio-economic characteristics					
domremit	Domestic remittances (1,000 VND)	2,958	6,858	6,471	13,527
forremit	International remittances (1,000 VND)	263	3,621	2,777	24,220
income	Income per capita from economic activities (1,000 VND)	25,440	37,373	30,706	25,792
Regions					
reg_1	Red river delta	0.09	0.29	0.26	0.44
reg_2	Northern midlands and mountain areas	0.33	0.47	0.15	0.36
reg_3	North Central and Central coastal areas	0.17	0.38	0.24	0.43
reg_4	Central Highlands	0.13	0.33	0.04	0.21
reg_5	South East	0.05	0.23	0.09	0.29
reg_6*	Mekong Delta	0.22	0.42	0.21	0.41

Note(s): * reference group
VND stands for Vietnamese currency (dong). The exchange rate was 22,800 VND/USD in 2016
Source(s): Authors' calculation from 2016 VHLSS

Table 1.
Description and summary statistics of key variables

over 65 dependency) is quite larger. Ethnic minority is more likely to involve in farming while the Kinh people (the majority) are more likely to diversify into non-farm employment.

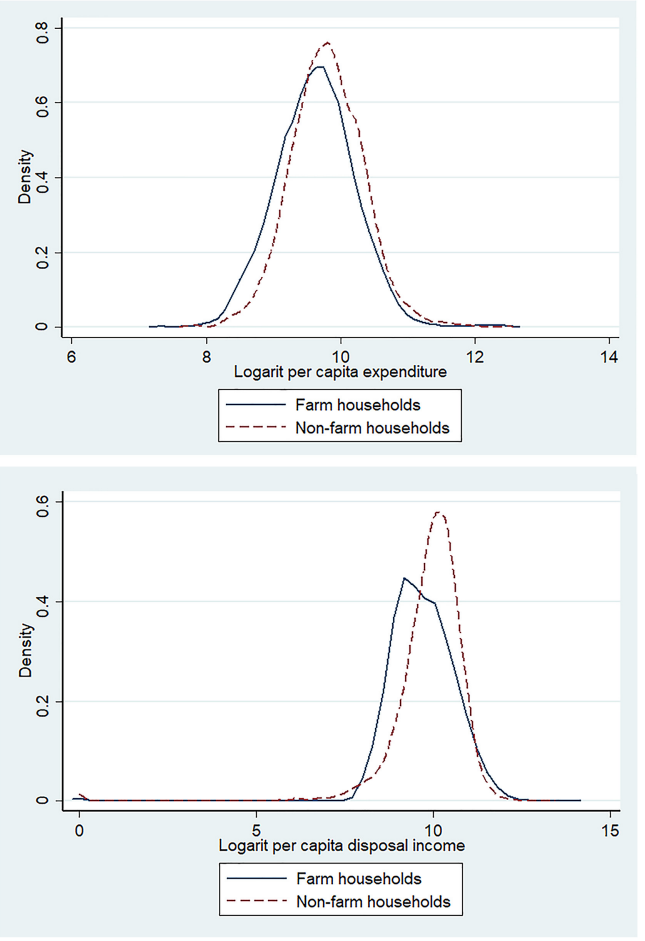
The percentage of farm households in the Mekong delta and the Northern midlands and mountain areas constitutes the greatest parts in the sampled households while, in the South East and the Red river delta, the opposite is true. It is obvious that the two latter regions are ones with highest level of industrial development while the two formers are characterized by the agricultural-based economy. In the North Central and Central coastal areas, the proportion of non-farm households is also larger than that of farm households due to the high development of the tourism industry.

Table 1 shows that the mean domestic remittance for non-farm households is about 6.5 million Vietnamese dongs which are much larger than that of about 3 million Vietnamese dongs for farm households. It is estimated from the 2016 VHLSS that 86% of non-farm households receive domestic remittance while 75% of farm households enjoy it. The standard deviation of domestic remittances is large for both household groups, indicating a significant variation in remittances across rural households, perhaps due to large differences in access to waged labour markets (Akram-Lodhi, 2005; Benjamin *et al.*, 2017). The mean international remittances for non-farm households is estimated at 2.8 million Vietnamese dongs, much more than those for farm households of only 0.26 million.

4.3 Inequality between farm and non-farm households

Further illustration of the inequality in expenditure and income between the two household groups is given in Figures 1 and 2. In both panels of Figure 1, the non-farm density distributions are almost located on the right of the farm ones, indicating that the per capita expenditures and income of non-farm households are likely to be higher than those of the farm counterparts at every quantile. It is interesting that the distributions of expenditures and income for farm households are likely to be more dispersed than those for non-farm households, revealing a higher disparity in the wealth among farm households in Vietnam.

In the right panel of Figure 2, at bottom percentiles, the income of the non-farm group is well below that of the others. In fact, a large part of marginalized and landless peasants has to diversify into non-farm employment as a survival strategy (Akram-Lodhi, 2005; Ravallion and Van De Walle, 2008). At the top percentiles of the two panels, the income per capita of the farm households is likely to be higher than that of the counterparts but the expenditure of the



Source(s): Authors' estimation from 2016 VHLSS

Figure 1.
Kernel densities of log household per capita expenditure and income

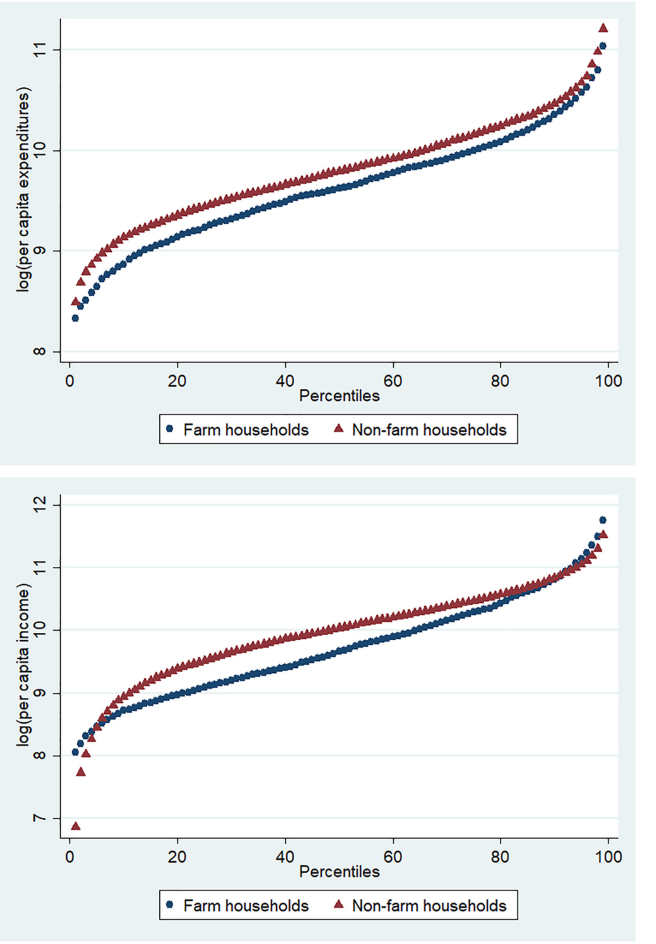


Figure 2.
Expenditure and income gap between farm and non-farm households across percentiles

Source(s): Authors' estimation from 2016 VHLSS

former is lower than that of the latter. Participation in non-farm activities are more likely to be involved in search costs, transport costs and living expenses that result in higher per capita expenditures for non-farm households. Rural households at top income percentiles may obviously be large landholders with huge capital stock that makes farming activities highly productive and then, generates high income from farming (Akram-Lodhi, 2005).

5. Estimation results and discussions

5.1 Factors affecting farm and non-farm household expenditures

Table 2 presents the estimation results of the OLS and UQR at the mean and the 10th; 25th; 50th; 75th and 90th percentiles of the household per capital consumption expenditure for farm and non-farm households, respectively. The coefficients of determination, R^2, of all models are relatively high and the p-values of the F tests for all zero slope coefficients of the models are small enough to reject the null hypotheses at 1% significance level. The impacts of the explanatory variables are interpreted as follows.

Table 2.
OLS and UQR estimation results for each household group at means and selected percentiles of per capita expenditures

Variable	Mean		10th percentile		25th percentile		50th percentile		75th percentile		90th percentile	
	Farm	Non-farm	Farm	Non-farm	Farm	Non-farm	Farm	Non-farm	Farm	Non-farm	Farm	Non-farm
age	0.000	−0.002**	−0.002	−0.001	0.002	−0.002**	0.001	−0.002**	0.000	−0.002*	−0.003	−0.002
	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
ethnic	−0.259***	−0.235***	−0.463***	−0.570***	−0.411***	−0.342***	−0.212***	−0.194***	−0.092*	−0.054*	−0.189***	−0.008
	(0.031)	(0.021)	(0.079)	(0.062)	(0.056)	(0.037)	(0.048)	(0.025)	(0.051)	(0.029)	(0.070)	(0.037)
educ	0.020***	0.029***	0.038***	0.026***	0.025***	0.028***	0.020***	0.030***	0.018***	0.030***	0.006	0.028***
	(0.003)	(0.002)	(0.007)	(0.004)	(0.006)	(0.003)	(0.004)	(0.003)	(0.005)	(0.003)	(0.006)	(0.004)
hhsize	−0.049***	−0.065***	−0.071***	−0.066***	−0.062***	−0.054***	−0.047***	−0.062***	−0.031***	−0.067***	−0.034**	−0.070***
	(0.008)	(0.005)	(0.020)	(0.011)	(0.013)	(0.008)	(0.010)	(0.007)	(0.011)	(0.008)	(0.018)	(0.010)
dep15	−0.442***	−0.306***	−0.704***	−0.245***	−0.338***	−0.293***	−0.375***	−0.303***	−0.483***	−0.337***	−0.627***	−0.279***
	(0.066)	(0.041)	(0.170)	(0.086)	(0.108)	(0.063)	(0.095)	(0.054)	(0.106)	(0.064)	(0.149)	(0.073)
dep65	−0.268***	−0.089***	−0.034	−0.183***	−0.264***	−0.133**	−0.282***	−0.098**	−0.426***	−0.064	−0.446***	0.005
	(0.059)	(0.032)	(0.114)	(0.068)	(0.097)	(0.049)	(0.083)	(0.044)	(0.095)	(0.053)	(0.100)	(0.069)
domremit	0.006**	0.015***	0.000	0.016***	0.004	0.017***	0.010**	0.013***	0.008	0.014***	0.011	0.013***
	(0.003)	(0.002)	(0.006)	(0.004)	(0.005)	(0.003)	(0.004)	(0.003)	(0.005)	(0.004)	(0.007)	(0.005)
forremit	0.030***	0.026***	0.009	0.014***	0.024***	0.025***	0.012	0.022***	0.025	0.029***	0.045*	0.034***
	(0.009)	(0.003)	(0.007)	(0.004)	(0.007)	(0.004)	(0.014)	(0.004)	(0.017)	(0.006)	(0.026)	(0.009)
income	0.208***	0.175***	0.175***	0.139***	0.206***	0.177***	0.209***	0.178***	0.220***	0.183***	0.188***	0.166***
	(0.012)	(0.007)	(0.042)	(0.020)	(0.043)	(0.020)	(0.042)	(0.019)	(0.044)	(0.018)	(0.058)	(0.020)
reg_1	−0.021	−0.009	−0.222***	0.020	−0.165***	0.022	−0.121**	0.001	−0.106	−0.039	0.030	−0.034
	(0.040)	(0.020)	(0.052)	(0.034)	(0.059)	(0.029)	(0.056)	(0.026)	(0.073)	(0.031)	(0.107)	(0.039)
reg_2	−0.002	0.008	0.000	0.108**	−0.044	−0.024	−0.151***	−0.18	−0.054	−0.061*	0.076	0.002
	(0.036)	(0.024)	(0.072)	(0.045)	(0.059)	(0.035)	(0.054)	(0.031)	(0.058)	(0.034)	(0.085)	(0.047)
reg_3	−0.099***	−0.096***	−0.224***	−0.100**	−0.180***	−0.097***	−0.145***	−0.101***	−0.023	−0.069**	−0.055	−0.059*
	(0.034)	(0.020)	(0.057)	(0.043)	(0.057)	(0.029)	(0.053)	(0.026)	(0.059)	(0.030)	(0.081)	(0.035)
reg_4	−0.080**	−0.114***	−0.259***	−0.330***	−0.190***	−0.175***	−0.126**	−0.025	−0.023	0.077	0.147	0.117
	(0.038)	(0.035)	(0.066)	(0.085)	(0.057)	(0.049)	(0.052)	(0.044)	(0.060)	(0.049)	(0.094)	(0.074)
reg_5	0.209***	0.146***	−0.047	0.105***	0.035	0.107***	0.209***	0.163***	0.302***	0.231***	0.666***	0.185***
	(0.049)	(0.026)	(0.045)	(0.039)	(0.046)	(0.033)	(0.059)	(0.036)	(0.084)	(0.046)	(0.167)	(0.056)
Constant	7.874***	8.194***	7.752***	7.900***	7.544***	7.825***	7.830***	8.177***	7.982***	8.459***	8.895***	8.918***
	(0.142)	(0.083)	(0.444)	(0.235)	(0.444)	(0.207)	(0.445)	(0.201)	(0.463)	(0.190)	(0.590)	(0.211)
R^2	0.458	0.359	0.229	0.187	0.323	0.240	0.331	0.243	0.246	0.179	0.139	0.101
Obs	1,900	4,670	1,900	4,670	1,900	4,670	1,900	4,670	1,900	4,670	1,900	4,670
Pr > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Note(s): Standard errors shown in brackets were calculated using the Bootstrap method with 300 replications
***, ** and * represent statistical significance level at 1%, 5% and 10%, respectively
Source(s): Estimated from 2016 VHLSS

The estimated coefficients on age of the household head, household size and child and elder dependency ratio are statistically significant and negative for almost percentiles of the per capita consumption expenditures for both household groups. The estimation results imply negative relationships between these predictors with household consumption expenditure. These findings are consistent with those found in Thu Le and Booth (2014) when they examine the rural-urban gap in Vietnam.

Ethnicity is found to have significant and negative effects on household consumption expenditures across percentiles. The per capita expenditure of ethnic minority groups is likely to be lower than that of Kinh people. Interestingly, for non-farm households, the size of the estimated coefficients is steadily decreasing from 57% at 10th percentile to 5.4% at the third quartile and become statistically insignificant at the 90th percentile while, for farm households, the gap decreases from 46% at the 10th percentile to about 19% at the 90th percentile.

As expected, the education significantly and positively affects the per capita expenditure of both household groups for the almost percentiles of the distribution. At mean, the returns to education for non-farm households is estimated at about 3%, larger than those for the farm households of 2%. At the 10th percentile, the mean expenditure of farm households increases by 3.8% with one additional year of schooling of the household head, relative to 2.6% of non-farm households. At the 75th percentile, the return to education for farm households is estimated at 1.8% while that for the non-farm households is 3.0%.

Remittances from domestic and international sources are all found to have significantly positive effects on per capita consumption expenditures of non-farm households across all percentiles while their effects on farm household consumption expenditure are statistically significant only at the mean and few percentiles. On average, a 1% increase in domestic remittances is likely to increase the per capita expenditure of farm households by 0.006%, while it increases that of non-farm households by 0.015%. At mean, the size of the effect of international remittance on farm household consumption expenditure per capita is 0.03, somewhat larger than that of non-farm household, 0.026. The size of the effect on non-farm households is increasing for almost entire distribution.

Household disposable income is highly statistically significant and positive predictors of consumption expenditure of both household groups across all percentiles. Generally, the marginal effect of disposable income on farm household expenditure is higher than that on non-farm households. For example, at the 75th percentile, as disposable income per capita increases by 1%, the per capita expenditure of farm and non-farm households will increase by 0.220% and 0.183%, respectively.

Significant regional differences in household per capita consumption expenditure are also found from Table 2, especially at the low percentiles. At the lowest percentile, households in most of the regions consume significantly less than whom in the Mekong Delta. At higher percentiles, households in the Southeast region consume significantly more than whom in all other regions. On average, the consumption expenditure per capita does not significantly differ across households in the Mekong Delta, Red River Delta and Northern midlands and mountain areas. The expenditure per capita of both household groups in the Southeast region is significantly higher than that in the Mekong Delta. This is consistent with the fact that the Southeast region has the highest standards of living among all regions.

5.2 Factors contributing to the consumption expenditure inequality

Figures in Table 3 show that the size of the specification errors and the reweighting errors are relatively small so the RIF function regression provides a relatively precise estimate of the endowment and coefficient effects.

	Mean	10th percentile	25th percentile	50th percentile	75th percentile	90th percentile
Quantiles						
Predicted gap	0.175***	0.271***	0.209***	0.172***	0.153***	0.111***
Endowment effects	0.177***	0.250***	0.222***	0.188***	0.139***	0.114***
Coefficient effects	−0.002	0.021	−0.013	−0.016	0.014	−0.003
Endowment effects						
age	0.000	−0.007	0.007	0.003	0.002	−0.011
ethnic	0.065***	0.116***	0.102***	0.052***	0.023**	0.047***
educ	0.022***	0.042***	0.027***	0.022***	0.019***	0.007
hhsize	0.016***	0.023***	0.020***	0.015***	0.010**	0.011**
dep15	0.012***	0.019***	0.009**	0.010***	0.013***	0.017***
dep65	−0.014***	−0.002	−0.014***	−0.015***	−0.023***	−0.024***
domremit	0.008**	0.000	0.005	0.013**	0.010*	0.013
forremit	0.007*	0.002	0.006***	0.003	0.006	0.011
income	0.056***	0.048***	0.055***	0.056***	0.059***	0.051***
reg_1	−0.003	−0.035***	−0.025***	−0.019**	0.017	0.005
reg_2	0.000	0.000	0.008	0.029***	0.010	−0.015
reg_3	−0.007**	−0.016***	−0.012***	−0.010**	−0.002	−0.004
reg_4	0.007**	0.021***	0.015***	0.010**	0.002	−0.012
reg_5	0.009***	−0.002	0.001	0.009***	0.013***	0.029***
Specification error	−0.001	0.041**	0.018	0.010	−0.020	−0.011
Coefficient effects						
age	−0.034	−0.04	−0.103	−0.019	−0.065	0.182
ethnic	−0.002	0.009	0.003	−0.019**	−0.011	0.005
educ	0.124***	0.050	0.137***	0.127***	0.138***	0.143**
hhsize	−0.081	−0.061	−0.020	−0.077	−0.099	−0.204**
dep15	0.004	0.013	−0.012	0.043	0.022	0.064
dep65	0.019**	−0.006	0.018	0.016	0.034**	0.031*
domremit	0.053	0.039	0.01	0.028	0.005	0.091
forremit	−0.003	−0.003	0.001	0.005	0.000	−0.010
income	−0.796**	−1.015**	−0.799*	−0.713**	−0.651*	−0.688
reg_1	−0.011	0.057***	0.027	−0.015	−0.054***	−0.046
reg_2	0.003	0.033**	0.017	0.009	−0.012	−0.016
reg_3	−0.010	0.037**	−0.002	−0.017	−0.017	−0.005
reg_4	−0.004*	−0.004	−0.007**	−0.001	0.000	−0.002
reg_5	−0.003	0.013**	0.001	−0.006	0.000	−0.029**
Constant	0.761**	0.925*	0.741	0.647*	0.744*	0.501
Reweighting error	−0.022***	−0.026***	−0.025***	−0.024***	−0.020***	−0.020***

Note(s): ***, **, and * represent statistical significance level at 1%, 5% and 10%, respectively
Source(s): Estimated from 2016 VHLSS

Table 3. Decomposition results from the extended OB model at mean and selected percentiles

At the mean, the expenditure of the non-farm households is 17.5% larger than that of the farm ones. The gap is estimated at 27.1% at 10th percentile and steadily decreasing to 11% at 90th percentile. The per capita expenditure gap almost comes from the endowment effect. Chang (2012) also finds a higher expenditure for non-farm households and covariate effects account for most of the gap in rural Taiwan. However, he finds the gap is increasing with the percentiles. For ease of scrutiny, we summarize the covariates that significantly contribute to the total effects over the entire expenditure distribution in Table 4.

Among covariates, ethnic differential accounts for the largest proportion in the endowment effects. At the mean, ethnicity accounts for about 37% (0.065/0.177) of the endowment effects. Ethnic differential also significantly contributes to the expenditure gap at all percentile and its contribution is decreasing with high percentiles. However, the coefficient effects of ethnicity are almost statistically insignificant at almost percentiles of the distribution.

The contribution of income to the gap is significant and largest relative to those of other covariates through both endowment effects and coefficient effects at entire distribution of the expenditures. While the covariate effect widens the gap, the coefficient effect narrows the gap. Since the size of the coefficient effect of income is well larger than that of the endowment effects, the net effect of income is negative to the expenditure gap. At the mean, income is likely to reduce the gap by 74 percentage points (= 0.056–0.796). The size of the net effect is largest for the poorest household group (−0.967) and decreasing along the distribution.

Both the endowment effect and coefficient effect of education are statistically significant and positive for the entire distribution. Then, education is likely to widen the gap between household groups. The endowment effects are diminishing with higher percentiles and become statistically insignificant for the richest, implying that the gap in education between the non-farm and farm households is narrowing as farmers become richer. On the other hand, the coefficient effect increases with higher percentiles. The size of the coefficient effects is much larger than that of endowment effects, indicating the importance of the returns to education in terms of expenditure in non-farm activities. The contribution of education to the expenditure gap accounts for 34% at 10th percentile and is steadily increasing to 135% at 90th percentile (Table 4).

Regarding the gaps caused by the remittances, the endowment effects are statistically significant and positive at the mean and some percentiles while all coefficient effects are not statistically significant. The sizes of the effects are also small, implying remittances contribute little to the expenditure gaps between farm and non-farm households.

Differences in household size and the child dependency ratio have positive impacts on the gap while elderly dependency ratio has negative ones. The contribution to the expenditure gap of the household size seems to be decreasing across the entire distribution. Meanwhile, the child dependency ratio significantly widens the gap with the largest size at the 90th percentile of 15% and the smallest size at the 25th percentile with only 4% of the endowment effects (Table 4). In contrast to the proportion of children, the proportion of members over 65 years old significantly narrows the expenditure gap.

Regional differences are found to contribute a small part to household expenditure gap. At the mean, the characteristic effects are statistically significant at 5% for North Central and Central coastal areas, Central Highlands and South East while the coefficient

Table 4.
Percentage of contribution of some selected covariates to the total effects (%)

Variable	Mean	P10	P25	P50	P75	P90
age	−19.43	−17.34	−45.93	−9.30	−41.18	154.05
ethnic	36.00	46.13	50.24	19.19	7.84	46.85
educ	83.43	33.95	78.47	86.63	102.61	135.14
hhsize	−37.14	−14.02	0.00	−36.05	−58.17	−173.87
dep15	9.14	11.81	−1.44	30.81	22.88	72.97
dep65	2.86	−2.95	1.91	0.58	7.19	6.31
domremit	34.86	14.39	7.18	23.84	9.80	93.69
forremit	2.29	−0.37	3.35	4.65	3.92	0.90
income	−422.86	−356.83	−355.98	−381.98	−386.93	−573.87

Source(s): Estimated from 2016 VHLSS

effects are almost statistically insignificant. The regional gaps are statistically significant at a few percentiles and mostly in the low percentiles. However, the sizes of the gap are trivial.

5.3 Discussions

Overall, the non-farm households have higher expenditures than their counterparts do for the entire distribution because they are likely to enjoy more favourable endowment factors, such as higher income, education, Kinh majority and remittances. This shows the fact that creating non-farm employment is crucial to welfare improvement for Vietnamese rural households. This is especially true for poorest farm households who are mostly small landholders and do not have enough capital assets to efficiently pursue farming. Empirical studies in Vietnam and other developing countries also confirm the significantly positive impacts of non-farm employment on household wealth, such as Himanshu *et al.* (2013), Hoang *et al.* (2014), Imai *et al.* (2015), Tran and Van Vu (2020) and Hossain and Al-Amin (2019).

Education is found to be the key predictor of the household expenditure and also the gap in expenditure. Then, for the rural workers to participate in non-farm employment, supports from the government for education and vocational training are necessary, especially for those at low percentiles. This is consistent with Chang (2012). Better-educated household heads are likely to spend more on consumption, especially on education of household members as an investment in human capital to promote them to participate in non-farm employment. Then, education is crucial to development policies which are aimed at improving welfare as well as closing the expenditure gap.

Interestingly, the expenditure gaps between non-farm and farm households are severe at low percentiles but diminishing at higher percentiles. Richest farm and non-farm households have almost equal expenditures and income, indicating that farming is also the likelihood strategy to become rich and close the expenditure gaps. Large scale farming and diversification or intensification into high-value crops may be the pathway for famers to become rich. These actions are possible due to the new land laws that remove largely land use restrictions and allow for land accumulation (Do and Iyer, 2008). However, as Ravallion and Van De Walle (2006, 2008) mention, land consolidation should be accompanied with increased marginalized and landless peasants.

Ethnic minority groups are likely to be less educated and reside at disadvantageous areas, inhibiting them to access waged labour markets and other non-farm employments (Baulch *et al.*, 2012). As a result, they are likely to have lower income and consumption expenditure than the Kinh people do (Kang and Imai, 2012). Then, government policies that are aimed at increasing access to non-farm employment for ethnic minorities by vocational training and non-farm job creation are essential to close the welfare gap between ethnic groups. In addition, improvement of infrastructures in disadvantage areas may also be among policy interests to increase access to non-farm employment that is likely to close the gap in expenditures between ethnic minority groups and the Kinh people. Add to this, Van De Walle and Cratty (2004) suggest urbanization and population control are likely to facilitate ethnic minority farmers to partake non-farm activities that may increase their living standards and hence, reduce the inequality.

Domestic remittances account for a large proportion of household income, especially for non-farm households. Domestic remittances mostly come from migrants to urban areas for non-farm employment. Nguyen *et al.* (2017) and Cuong and Linh (2018) well document that more and more rural households send their members to urban and industrial development areas and enjoy remittances. They also find a significantly positive effect of internal remittances on household consumption expenditure. Then, migration for employment is also a pathway to improve rural household welfare and hence reduce inequality.

6. Conclusion

By using the extension of the OB decomposition model based on UQR regression associated with the re-weighting approach, we find a large inequality in household per capita consumption expenditure between farm and non-farm households in rural Vietnam, using the 2016 VHLSS. At the mean, non-farm households spend on consumption 17.5% more than farm households do. The consumption gap between two household groups is statistically significant for the entire distribution of the expenditures and decreasing with higher percentiles, from 27% at the lowest percentile to 11% at the top percentile. The characteristic effects account for most of the gap between the farm and non-farm households. Differences in household characteristics such as ethnicity, education, household composition, transmittances and income explain most of the gap in expenditures between two household groups in rural Vietnam. Differences in ethnicity between the two household groups contribute the greatest part in the endowment effects. On the other hand, education of the household heads and income contribute much to the expenditure gap through both endowment effects and coefficient effects. Both endowment effects and coefficient effects of education widen the expenditure gap at almost all percentiles while the net effect of income reduces the gap.

Notes

1. Note that, at a certain distributional statistic, $v(F)$, as the conditional expectation is linear with X, then, $\gamma_1^v = \gamma_0^v$ and $\mathbb{E}(R^{q_\tau}) = 0$, in case of the mean $(v = \mu)$, the FFL decomposition model is exactly the standard OB model.
2. Six regions of Vietnam include the Red River Delta, the Northern Midlands and Mountains, the North Central Coast and the Central Coast, Central Highlands, Southeast and the Mekong Delta, of which, the Mekong Delta is defined as the reference group.

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