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Whether or not the informal economy as an engine for poverty alleviation in Vietnam

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WHETHER OR NOT THE INFORMAL ECONOMY

AS AN ENGINE FOR POVERTY ALLEVIATION IN VIETNAM?

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Abstract

This paper examines impacts of income from informal employment and informal sector employment on poverty in Vietnam to define whether the informal economy is an accelerator or a decelerator of poverty. Using data from Vietnam Household Living Standard Surveys, we find that although income from informal sources does not account for a large proportion to total income of the poor households in comparison with the non-poorhouseholds, it significantly contributes to poverty reduction. Without earnings from informal sources, 33.4 per cent of the surveyed households in 2010 live under the poverty line and this rate is only 10.34 per cent if informal income is added up. Both probit and quantile analysis affirms that informal earnings significantly mitigate poverty. Interesting findings from quantile regression are that informal earnings have divergent effects across distribution of household income. Particularly, it is a factor reducing poverty in poor households but it negatively affects the economic capacity of the rich households. The policy implication derived from empirical results is that poverty program should be associated with supporting policy for informal employees with low income so that they can improve their living standards.

JEL classification codes: O17, I32

Keywords: informal economy, poverty

I. Introduction

In Vietnam, the informal sector is believed to continually maintain its considerable proportion for coming years (Cling et al. 2010). Although the informal sector is normally associated with poor, unproductive and excluded workers, it is undeniable about a significant role of the informal economy to the development of the economy. The informal sector helps to solve the problem of being unemployed for a large portion of unskilled labor and vulnerable groups of the society. However, the interpretation of the influence of the informal economy on poverty depends on the adopted theoretical framework. Some researchers are in line with pessimistic point of view. These scientists assert that the informal sector perpetuates poverty and the effect of informality on poverty reduction is negative. Nevertheless, the larger part of literature peruses an optimistic sentiment and concludes that there is a positive linkage between informality and poverty alleviation. In this paper, we try to exam the impact of the informal economy on poverty in Vietnam to see whether Vietnam's empirical study supports pessimistic or optimistic view.

We use data from the Vietnamese Households Living Standard Surveys (VHLSS) carried out in 2006, 2008 and 2010 to first draw a picture of the informal economy and then we calculate the poverty rate with and without informal income to find out the contribution of the informal economy on poverty reduction. Then in econometric analysis, we estimate influence of informal income on household's economic capacity. Particularly, probit model is employed to investigate the impact of informal income on the probability of the household being poor. Additionally, we use quantile regression for the suspicion that the effects of informal income are not equal across levels of household income. Quantile regression allows us to examine the whole distribution of household income rather than looking at the conditional mean as OLS regression does. Therefore, the role of the informal economy in poor households can be distinguished as the aim of this research.

The paper is structured into eight sections. Besides the introduction part, in the following sections, we provide a selective overview of the existing literature then some definitions used in the literature and the definition as well as the data employed in this paper. After that the recent trend of the informal economy and poverty in Vietnam is introduced. The next section is methodology. Section seven provides empirical results while the last section gives the concluding dicussion and some policy implications.

II. Literature review

Recognition of the informal sector

The literature has shown that an economy can be separated into a formal and an informal economy regardless of characteristics of that economy. However, initially the informal sector did not get much interest from economists. Sociologists and anthropologistswere the first scientists who paid interest on the existence of informal activities. The informal sector is first introduced by Hart (1970, 1973), asocial anthropologist. Nevertheless, the concept of the informal sector applied in his research covers the self-employment in developing countries only. The informal sector was then fully recognized in a report on Kenya of the International Labour Organization (ILO) in 1972. In this report, the informal sector refers to the activities of the poor who are working very hard but are not recognized, recorded, protected or regulated by thepublic authorities (ILO, 1972). This major sector found more relevance in developing economies. Papola (1980) argues that the developing economy is normally a dualistic economy where small andtiny production units run in unorganized and informal ways and mostly on selfemploymentbasis. Later, De Soto (1989) defines the informal sectorby focusing on the regulatory framework. He asserts that legal status is the main element to distinguish between the informal and formal sector.

Up to now, the informal sector has been defined in various ways (ILO 1972; Weeks 1975; Bromley 1978; Castells & Portes 1989; International Conference of Labor Statisticians 1993; Tokman 2001; Pratap & Quintin2006). The literature on the informal sector is fraught with terminological confusion(Harding and Jenkins, 1989). However, all of the definitions agree on the feature that the informal sector occurs outside the legal framework. In general, the informal sector includes two types of employments. The first type is self-employed and unpaid family workers while the second one includes wage-employed workers without a fixed employer or social insurance coverage or payment of taxes.

Characteristics of the informal sector

According to Harding and Jenkins(1989), the informal sector is shaped based on three institutional patterns, which are political, economic and social aspects. With respect to the political aspect, the informal sector is characterized as involving lack of government regulation, illegalactivities and consequently substantial errors in measuring the national product. Although the introduction of the political pattern is an important achievement, more attention is to put on economic one. The labour market or status of labor, tax evasion, size

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of activities, professional status, regulation or registration of an activity and GNP accounts are sub-criteria of the economic pattern to describe the informal sector (Harding and Jenkins 1989, Renooy 1990 and the ILO 1972). With respect to the social pattern, main sub-criteria are significant social networks, more autonomy, flexibility, freedom and survival aspect (Gerxhani, 2004). In general, the informal sector is characterized by low productivity, low investments, poor working conditions, long and uncertain working hours, low wages, poor market conditions and poor institutional support (Agarwal and Dhakal, 2010).

Linkage between informality and poverty

Empirical studies agree that the informal sector under any version of definition is quite large and makes considerable contribution to employment in developing countries. However, its linkages with poverty are still controversial. As far as connection between poverty and informality is concerned, we can divide literature into two groups of ideas, namely the pessimistic and optimistic group.

With respect to the pessimistic point of view, the informal sector consists of marginal and subsistence activities, where the productivity and earnings of its participants remain low. Informal workers enjoy little social protection, and working conditions are very poor (ESCAP, 2006). Therefore, the informal sector perpetuates poverty and the effect of informality on poverty reduction is negative. In addition, Crotty (2009) finds that the high incidence of informal employment in the developing world creates poverty traps for workers and suppresses the ability of developing countries to benefit from trade. He explains that informal employment makes it difficult for workers to acquire formal generic skills while companies operating in the informal sector tend to be too small to support innovation and value creation or to be able to exploit economies of scale. In addition, Timofeyev (2013) uses the latest available data from Russian Federal State Statistics Service to calculate the scales of labor income of the poor in the informal sector then makes a comparison with average wages in the formal sector and the official poverty line. The study concludes that the informal sector is a factor of social stability in a post socialist transition economy, which, however, cannot alleviate poverty.

The second view is that not everyone working in the informal sector is poor and there is a positive linkage between informality and poverty alleviation. A lot of empirical studies support this optimistic sentiment. Admittedly, the vast majority of informal participants have low incomes and live below or close to the poverty line (ESCAP, 2006). However, without the informal sector, the intensity of poverty would be much higher.

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Cartaya (1991) emphasizes that a significant portion of household income comes from the informal sector, both for poor and non-poor households in Venezuela. The author finds an important relationship between poverty intensity and informality, given that the families in extreme poverty registered the greatest part of their income coming from the informal sector. Additionally, Orlando (2001) shows that the increase in the rate of informal earnings is lower than the increase in the rate on the number of workers in the sector. This means that the incidence of poverty is higher in the informal sector than in the formal sector. Hence, he suggests that a strategy to reduce poverty should be to increase productivity and wage levels in the informal sector through improving education, experience, and capital access for informal employees. Agarwal & Dhakal (2010) show that in developing countries, the main reasons for joining the informal sector may be to safeguard poor and marginalize from poverty and unemployment. Based on Nepal's experiences, Agarwal and Dhakal (2010) also suggest that the informal sector is a good source of livelihood for poor and marginalized groups. They prove that earnings from the informal sector have been making a strong impact on the households' livelihood. Surprisingly, without the earnings from the informal sector, more than 94 per cent of households are drowned in poverty, but only 12.9 per cent of households remain in poverty and 46 per cent of the households have been able to join the middle income and high income classes due to the income generated from the informal sector activities.

Empirical studies of the informal sector in Vietnam and the room for this study

Existent studies on the informal economy in Vietnam are about general analyses on the informal sector and informal employment (Cling *et al*, 2010; Le *et al*., 2010); informality and business climate (Van Arkadie & Mallon, 2003; ADB, 2004; Nguyen & Pham, 2006; Vijverberg *et al*., 2006); informal sector dynamics (Hansen *et al*., 2005; Bernabe & Krstic, 2005; Vijverberg *et al*., 2006; Oostendorp *et al*., 2008; Tran & Nguyen, 2008); migration and informal employment (Nguyen *et al.,* 2010; Tran *et al*., 2010; Huynh *et al*., 2010) or household' non-farm activities and risk diversification (Vu, 2006; Pham, 2006; Oostendorp *et al*., 2008). There is no study exploring the link between poverty and informality, which have been carried out widely in the literature of the developing countries.

The evidences of the role of the informal economy in poverty reduction in many developing countries and the missing of studies on the relationship between the informal economy and poverty in Vietnam leave the room for this study. It makes sense to expect that the informal economy has had a positive impact on poverty

reduction in Vietnam. Therefore, it is essential to carry out this research since the informal sector is expected to continue representing a huge share of the employment in Vietnam (Cling *et al*, 2010), while poverty has still been a problem in Vietnam for certain years ahead. The research sets out to provide an in-depth and practical analysis on the relationship between the informal economy and poverty reduction in Vietnam for the first time ever.

III. Some definitions

International literature has noticed that measuring employment in the informal economy is not an easy task. Although an international statistical definition was adopted in 2003, characteristics of "informalization" vary from place to place and many countries face difficulties when trying to adequately tackle the informal economy in their national employment statistics (MOLISA,2010).

In Vietnam, the General Statistics Office (GSO) has developed the definitions for both the informal sector and informal employment. According to the GSO, the informal sector in Vietnam is defined as all private unincorporated enterprises that produce at least some of their goods and services for sale or barter, do not have a business license and are engaged in non-agricultural activities. Employment in the informal sector is referred to as informal sector employment. On the other hand, the informal employment is operationally defined as unpaid family work or wage and salaried work without social security in the non-agricultural sector. It therefore comprises of employment in the informal sector as well as parts of employment in the formal sector. Hence, the informal economy includes both the informal sector and informal employment.

In this paper, due to limitations of the data collected before 2010, which will be presented in the section 4, we adopt the definitions developed by Nguyen Huu Chi (2010). In his paper, "health care insurance" will be used as a proxy for "social insurance" to define formal or informal wage workers. He affirms that "health care insurance" is a good proxy for "social insurance" because it represents social security as the GSO and international definition. On the other hand, formal and informal self-employed workers are identified using criterion of "registration of household business". Combination of informal wage workers and informal self-employed workers is called informal workers. Thus, according to Nguyen Huu Chi 's definition, informal workers include both informal employments and a part of informal sector employment in the GSO's definition. Corresponding to the definition of informal workers, informal income is constructed from two sources. Firstly, for wage workers, earnings are obtained by summing the direct wage with all the supplementary benefits

perceived in cash or in kind and converted into pecuniary equivalent. Secondly, for self-employed workers, income is calculated from non-farm business of the households.

IV. Data

The most popular data set used in analysis of the informal economy is the Vietnam Labor Force Surveys (LFS) conducted by the GSO. However, as their purpose, these surveys provide only information about the labor market in Vietnam. Non-labor income, expenditure and information helping to identify poor and non-poor households are beyond the survey interest. Thus, the LFSs no longer match the objective of this study.

The Vietnamese Household Living Standards Surveys (VHLSS) are the unique national surveys containing information about both employment and living standard. To evaluate living standards for policy-making and socio-economic development planning, the GSO conducts the VHLSS regularly every two years from 2002 to 2010. Sampling of the VHLSS covers 64 provinces and 8 regions and its representative at the national and regional level in both rural and urban areas of Vietnam. Interviewed contents include basic demography, education and health status, occupation, income of all household members and expenditure, business, fixed assets, durable, housing and participation in poverty reduction programs of households. Therefore, the data set promisingly provides rich information relating to jobs and income of the household to categorise them into poor or non-poor one. The only shortcoming of these survey data in the informal economy analysis is shortage of information on social insurance in those conducted before 2010. Dealing with this disadvantage, as mentioned above, "health care insurance" will be used as a proxy for "social insurance". Therefore, the estimated results may be bias to some extent.

In the VHLSS 2010, all household members who work for wage are asked if having social insurance from their jobs. Thus, informal employment can be truly identified as the GSO's definition. Both informal workers defined by health care insurance or by society insurance will be presented for the stake of comparison and measuring the bias due to difference in definitions. Only data from the VHLSS 2010 is used in the econometric models while data from the VHLSS 2006 and the VHLSS 2008 provides descriptive statistics figures.

V. Recent trend in the informal economy and poverty in Vietnam

Informal workers and the share of informal income in Vietnam from 2006 – 2010: some statistic indicators

Table 1 below provides information about the informal workers in Vietnam from 2006 to 2010 based on the VHLSS 2006, 2008 and 2010. In the first three columns of years, informal figures are defined by the criteria of health care insurance and the last column in the table presents informal figures based on the criteria of social insurance for the comparison purpose.

It is clear that informal workers account for significant proportion of the total workforce in Vietnam. The table shows that informal workers, as a share of total employed labor including or excluding agriculture in the denominator has the same trend, decreasing in the first two years and then rising in the remaining year. The decreasing trend from 2006 to 2008 is possibly explained by the increase of formal employment in the economy. It does not mean the informal economy is downsizing (MOLISA, 2010). Whereas, the increase of the informal rate in the later period might be the consequence of the global crisis in 2008, when a large number of employees were dismissed from their jobs. According to ILSSA (2010), six months beginning of 2009, there were 107 thousand labors losing their jobs, accounting for 18 per cent of the labor force in surveyed enterprises. A part of these unemployed forces had to move to the informal sectors to find a new job or involve in informal employment. As the result, the informal employment went from 27.9 per cent in 2008 to 29.6 per cent in 2010.

Table 1: The informal worker in Vietnam period 2006 – 2010 (%)

Indicators	2006	2008	2010	2010*
Informal worker rate including agriculture labor in denominator	29.64	27.85	29.64	27.63
Informal worker rate excluding agriculture labor in denominator	39.68	37.43	39.26	36.61
Informal worker rate excluding agriculture labor	100	100	100	100
Informal wage worker rate	56.39	58.66	63.85	61.24
Informal self-employed worker rate	43.61	41.34	36.15	38.76
% Informal income in non-agriculture income of household	35.78	35.03	29.44	35.22

*Source: author's calculation from VHLSS 2006, 2008, 2010, * Using the criteria of social security to define informal wage worker*

Of the total informal workers excluding agriculture labor in denominator, there was a significant increase in informal wage workers, while informal self-worker followed a contrary trend over the period 2006 - 2010. It

is argued by the MOLISA (2010) that the decrease in the informal self-employment rate is in line with increases in wage and salaried employment in the industry and service sectors.

Comparing the two columns of 2010, it can be seen that using the definition of health care insurance leads to more than 2 per cent overestimation of informal workers, which stems from overestimation of informal wage workers.

It is undeniable the importance of informal income in the total income of households. On average, income from this source accounts for around one thirds of non-agriculture income. While the informal worker rate increased in the period from 2008 to 2010, the proportion of informal income in household's non-agriculture income considerably fell. This implies the fact that growth rate of formal income is much higher than that of informal income, which is a disadvantage of informal employment.

The role of informal income in poverty alleviation in Vietnam

The contribution of informal income in thetotal income of the household

The following table shows average shares of informal income in the total household's income as well as in household's non-agricultural income according to household classification.

Unlike expectation, proportion of informal income in poor households is not as large as that in non-poor households. It does not mean that the proportion of earning from formal sources in poor households is large. Because of the fact that in addition to labor income, poor households have non-labor income such as government transfers or community aids.

Table 2: Average share of informal income in the total income of the households

Household groups	Share in total number of households (%)	Proportion of informal income to total household's income (%)	Proportion of informal income tohousehold's non-agricultural income (%)
Poor[1]	10.34[2]	13.67	19.82
Non-poor	89.66	29.81	36.99
Total	**100**	**28.13**	**35.22**

Source: author's calculation from VHLSS 2010

Informal income and poverty alleviation.

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[1] Under the Decision number 9/2011/QĐ-TTG of the Prime Minister, the poor group includes all the rural households with income less than 400 thousand dong per head per month and all the urban households with income level less than 500 thousand dong per head per month.

Evidences from empirical studies in other developing countries have pointed out the relationship between poverty and informality. From the Table 3 below, we can see that the informal sector is a good source of livelihood for poor and marginalized classes.

Table 3: Household classification with and without informal income

Quintile	1st	2nd	3rd	4th	5th	Total
Poverty rate (%)						
if informal income included	51.78	0	0	0	0	10.34
If informal income excluded	71.2	38.9	30.0	19.3	8.5	33.5
Proportion in total households (%)						
With informal income	20	20	20	20	20	100
Without informal income	44.5	16.1	12.2	12.5	14.8	100

Source: author's calculation from VHLSS 2010

The table 3 demonstrates how the poverty rates and proportion of the households will change if the informal income is excluded from the total household income. Households at all quintiles, even the richest households (at 5th quintile), are possible to be poor if informal income is cut off from total income of the household. The most suffering from this exclusion is the 2nd quintile or near poor households with the poverty rate rising by almost 40 per cent. Excluding informal income and keeping the quintile values unchanged make the percentile also move toward poorer groups. 44.5 per cent instead of 20 per cent of households drop in the 1st quintile or the poorest group and the portion of households in the 3rd and the 4th quintile is just over 12 per cent. 33.5 per cent of households are drowned in poverty after excluding informal income from the total earning of households. The original poverty rate is 10.3 per cent. Therefore, it can be concluded that 23 per cent of the households are able to get out of poverty thanks to the earnings generated from informal activities.

VI. Methodology

For the purpose of exploring the impact of the informal economy on poverty reduction, firstly Probit model is applied to examine responsiveness of poverty situation on earnings from informal sources. Then the household income is regressed on informal earnings to find out the contribution of informal earnings to the total income of the household. However, this contribution is suspected to be not uniform across all income levels of households. Thus, the quantile regression is employed to explore the variation across the entire distribution of household's income. Besides, the OLS estimation is used for comparison and the interqualtile regression, which reports coefficients that are the difference in coefficients of two quantiles, is also presented

in this paper to test the hypothesis of unequal impact of explanatory variables on the dependent variable.

Probit model

Denoting a variable I that is a linear function of the variables that determine the probability

$$I = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k$$

where X is used to denote the full set of explanatory variables.

Assuming that there is a threshold value of I, called I^* such that:

$$Y = 1 \text{ if } I > I^*$$

$$Y = 0 \text{ if } I < I^*$$

The threshold I^* is a latent variable, determined by $I^* = I + u$ with assumption that u is independent of X and it is standardize normal distribution.

Given assumptions above, the probability that I_i^* is less than I is determined by the function F(I) which is the standardized cumulative normal distribution

$$p_i = p(Y = 1|X) = p(I^* < I) = F(I_i) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_k X_k} e^{-\frac{1}{2}t^2} \, dt$$

where $p(Y = 1|X)$ represents probability of the occurrence of the event for any value of X

F(I) is the cumulative standardized normal distribution, therefore f(I) which is its derivative is just the standardized normal distribution itself:

$$f(I) = \frac{1}{\sqrt[2]{2\pi}} e^{-\frac{1}{2}I^2}$$

Estimates of the parameters is obtained by maximum likelihood analysis use. The marginal effect of Xi is $\partial p / \partial X_i$ which is best computed as

$$\frac{\partial p}{\partial X_i} = \frac{dp}{dI} \cdot \frac{\partial I}{\partial X_i} = f(I) \cdot \beta_i$$

Quantile regression

The method of ordinary least squares (OLS) is popularly employed for estimating the parameters in order to explain the relationship between the dependent variable and a set of independent variables. Just as classical linear regression model for the conditional mean functions, the quantile regression provides the mechanism for estimating models for conditional quantile functions (including conditional median function). In contrast

to the parameter estimation of OLS by minimizing a sum of squared residuals, the parameters can be estimated by minimizing a sum of absolute residuals to derive the "central tendency" of the effects from the conditional distribution of median. Median and mean are both very important location measures which characterize the "center" and "average" of distribution respectively; however, they may provide little information about the distribution of tails. For example, two distributions which have same means could differ in pattern of distributions such as different variance and skewness. Similarly, median can describe the location of distribution to some extent, we have to observe quantiles rather than median to have a complete understanding of the whole distribution.

Quantile regression was proposed by Koenker & Bassett (1978). Consider a sample (y_i, x_i), i = 1...n from a population where x_i is an Kx1 vector of regressors. The quantile regression model is postulated as follows:

$$y_i = x_i' \beta_\theta + u_{i,\theta}$$

where $u_{i,\theta}$ represents the error term such that $Quant_\theta(u_{i,\theta}|x_i) = 0$. Thus,

$$Quant_\theta(y_i|x_i) = x_i' \beta_\theta$$

where β_θ is the vector of parameters; $Quant_\theta(y_i|x_i)$ denotes the θth conditional quantile of y_i given a set of regressors, vector x_i. The assumption that $Quant_\theta(u_{i,\theta}|x_i) = 0$ implies that only the error term $u_{i,\theta}$ satisfies the assumption that the θth quantile of $u_{i,\theta}$ (i.e., $y_i - x_i' \beta_\theta$) conditional upon the vector of regressors is equal to zero. This assumption is made simply to identify the intercept term in β_θ. The θth ($0 < \theta < 1$) quantile regression estimator $\hat{\beta}(\theta)$ is obtained by minimizing the following problem:

$$\min_\beta \frac{1}{n} [\sum_{i:y_i \geq x_i' \beta} \theta |y_i - x_i' \beta| + \sum_{i:y_i < x_i' \beta} (1 - \theta)|y_i - x_i' \beta|]$$

This is normally written as:

$$\min_\beta \sum_i \rho_\theta (y_i - x_i' \beta_\theta)$$

Where $\rho_\theta\{u\}$ known as the check function defined as follows:

$\rho_\theta\{u\}$=θu if $u \geq 0$ or $\rho_\theta\{u\}$=(θ-1)u if u <0.

Given θ, minimizing this function yields the θth sample quantile of y.

The difficulty in estimation is that the quantile regression estimator $\hat{\beta}(\theta)$ does not have an explicit form. However, the desired estimator $\hat{\beta}(\theta)$ can be obtained by linear programming methods. Standard errors are obtainable by bootstrap methods.

The first quartile is obtained by setting θ = 0.25 and so on. Quintiles are the 20th, 40th, 60th, and the 80th position over the distribution. As θ is setting any value from 0 to 1, one traces the whole distribution.

In conclusion, quantile regressions outline different points of a conditional distribution,which represents a parsimonious way of describing the entire distribution. In addition, they provide much more valuable information in the case that the relationship between the regressors and the dependent variable evolves across its conditional distribution.

Variable construction

Dependent variable

The dependent variable introduced in the Probit model is a dummy variable defining a poor household while that in the quantile and OLS regression is natural logarithm of household's per capita income.

Explanatory variables

Informal income

Informal income or informal earnings are a primary explanatory variable in the model because it helps to answer the question that whether the informal economy reduces poverty. Related to the total income of the household, income from informal sources is just a portion of household's income because total income of households contains income generated by informal workers, by formal workers and non-labor income.

In the Probit model, natural logarithm of informal income rather than its original value is used because natural logarithm is more normalized and less various than its levels. In this case, the estimator, say βincome, shows 1 per cent increase in informal income resulting in βincome per cent increase in probability of being poor. Meanwhile, in the quantile and OLS regression, informal income is represented by a dummy variable to avoid endogenous relationship between informal income and the total income of the household. The dummy variable is equal to 1 if the household has informal income and equal to 0 if otherwise.

Household head's characteristics

In the VHLSS, the householdhead is regarded as a dominant decision maker in the household, hence, head's characteristics have certain effects on the household's economic capacity. Variables of age, age square,

education (measured by the highest attained qualification) of the head and dummy variables defining sex, ethnicity and vocational training experience of the head are employed in the empirical models. These variables are widely used in literature related to researches on poverty in Vietnam (see Nguyen, Binh T *et al.* (2006), Bob B *et al* (2010), Woojin. K *et al* (2010)).

Demographic factors

Household size and the burden rate in the family directly and strongly affect poverty situation of the household as it changes per capita income of the household. Both factors are expected to accelerate poverty. In this paper, a burden is a family member whose age is under 15 or over 60 regardless of their employment. The reason for this is that these people are beyond working age regulated by the Vietnamese Labor Code. In addition, productivity of these members in general is not high so their earnings possibly cannot cover their living costs. The burden rate is calculated by dividing number of burden by number of household size.

Geographic factors

In Vietnam, location of the household is an important factor impacting living standard of the household. Therefore, a dummy variable defining a household living in urban or rural area and seven dummy variables representing eight economic regions in Vietnam are used as explanatories in the model. In 2010, the difference in per capita income between urban and rural area is two times; between the richest region and the poorest one is three times. The poverty rate in rural area is about two and a half higher than that in urban area and this rate in the most disadvantageous region is as twelve times as the rate in thewealthiest region. The detail of area and regional difference in poverty and per capita income can be found in the Table 4 in the Appendix.

VII. Empirical results

The Table 6 shows Probit regression, quantile regression with five specific conditional quantiles (0.1 0.25 0.5 0.75 0.9) and OLS regression for comparison. Table 7 shows interquantile regression difference between the two tails (q0.9-q0.1), right side above the median (q0.9-q0.5) and two sides of median (0.75-0.25), left side below the median (q0.5-q0.1). The coefficient graphs for quantile regression are presented in the Figure 1.

Probit model

Positively statistical significance of the key explanatory variable, natural logarithm of informal income, shows that an increase in informal income will help to reduce the probability of the household being poor. Thus, it

can be said that empirical result in Vietnam supports the optimistic view of the role of informality in poverty reduction.

Sex of the head has no significant effect on the poverty suggesting that households with the male head have the same level of income risk of being poor to households with the female head. Whereas, the poverty probability being a convex function with respect to the head's age (negative sign of age's coefficient and positive sign of age square's coefficient) implies that the higher age of the household head is, the less likely to be poor the household is and the relationship between age and poverty is nonlinear. Enriched contribution of age on poverty alleviation will decline when age of the head rises. Education and vocational training of the head are other factors significantly helping the household to get out of poverty. Ethnicity of the head shows the big difference in the probability of being poor between households with the Kinh head and households with the minority head. The minority household is 11 per cent more likely to be poor than the Kinh household, other things equal.

Both variables reflecting demographic aspects, household size and burden rate, are recognized as factors accelerating poverty. Of which, burden rate performs a strong influence on poverty. Particularly, an additional per cent of burden rate associates with 5 per cent increase in probability of being poor.

Geographic factor significantly affects probability that a household is poor. The urban households are less likely to be poor than the rural ones and the households in the Red River Delta, South Center Coast, Central Highlands, South East and Mekong River Delta suffer from lower risk of poverty than those in the North West, the base region and also the poorest region in Vietnam. This probability among the three poorest regions in Vietnam, including the base region and North East, North Center Coast, has no statistical difference when other things are controlled.

Quantile regression

The quantile regression results show that the effect of the informal earnings on household per capita income is not large but statistically significant. In general, the effect is different among the quantiles but it can be grouped into three distinguished dimensions. Firstly, for the households on the left hand side of the median, the effect of informal earnings is larger in poorer households, or informal earnings play a greater role in improving per capital income in poorer households. The 10th percentile which is also extreme poor households is observed the largest and highly significant positive impact of informal earnings on the

household income. At the 10th percentile, per capita income of households having informal earnings is 9 per cent higher than those without informal earnings. This difference at the lower quartile falls by 5 per cent. Secondly, the informal earnings have no power of explanation for the variation of household income at the median or in households in the middle class. Thirdly, for the richest households, informal earnings turn around to be the factor increasingly decelerating household income. The effect magnitude of informal earnings is negatively larger for richer households.

The various impact of informal earnings among quantiles can be interpreted as following. For the households having income under the median level, informal sector and informal employment are channels to improve their living standard. Specially, for poor households, informality is an important source bringing income and helping them to get out of poverty. This can be possibly explained by the fact that the poor have many disadvantages, which also encumber them to enter the formal economy. As the result, they have to work in the informal economy for livelihood. And because these poor households have extremely low level of income, additional income from informal sources, even not much, might still help them to improve their living standard. Whereas, for the middle class, their income reaches to a certain level that is not significantly affected by informal earnings. In contradiction to poor households, for the rich class, involvement in the informal economy seems to be adversity. It is possible that when people are very rich they trend to formalize their economic activities so existence of informality will negatively affect their income in general.

Unlike complicated impact of informal earnings on household per capita income, other explanatory factors perform the uniform relationship among quantiles. In the other words, coefficients have the same sign across distribution of income level. Conclusion from quantile analysis is almost consistent to that from Probit model, except for regional variables. The North Center Coast turns around to be statistically significant and is the only region having lower per capita income than in the base region, the North West, although the North Center Coastis not the poorest region in Vietnam. It is possible that when other explanatory factors are controlled in the model, households in the North Central Coast at analyzed quantiles of income suffer from more disadvantages than those in the North West. Whereas, the South Center Coast now is at the same per capita income to the base region if percentage points of distribution are examined rather than average of distribution.

OLS regeression

Most results obtained from the OLS regression are consistent with those from the quantile regression. A negative association between the household income and minority households, burden rate, household size, households in the North Center Coast and a positive correlation between the dependent variable and head's age, head's education, head vocational training, urban households, households in the Red River Delta, in South East, in Mekong River Delta are found in OLS estimation. Unlike the quantile regression, the OLS result cannot distinguish the complicated effect of informal earnings on household per capita income at different levels of income. This explains why informal earnings have no power of explanation for the variation of the household income in the OLS regression.

Interquantile regression

The interquantile regression shows that informal earnings are the only variable whose impact is significantly various across the whole distribution of the household's income. This reaffirms the conclusion that influence of the informal economy is complicated and different between poor, middle and rich households. Thus, applying quantile regression to analyze impact of informal economy on poverty is a proper method.

VIII. Conclusion and Policy implication

The paper investigates the linkage between informal income and poverty based on the VHLSS data. Both descriptive statistics and econometric models show that income from informal sources significantly alleviates poverty, which supports the optimistic point of view. This paper is the first studying relationship between informal economy and poverty in Vietnam and it is also the first in literature applying quantile regression to analyze this relationship. Thus, the paper considerably contributes to the literature of informality as well as poverty.

In short, the paper first apply probit model to investigate the relationship between informal income and probability of being poor. The results suggest that an increase in the informal income helps the household to decrease the probability of being poor. In addition, the regression results also show that the probability of the household being poor is lower if the education and vocational training of the households' heads is higher and if head's ethnicity is King. The effect of head's gender is ambiguous while the relationship between head's age and poverty is nonlinear. Burden rate and household size both increases the probability of being poor. With respect to geographic factor, the probability is higher if the household is living in the rural areas or in the base region, which is the North West.

Next, using the quantile regression method, the paper has been able to explore the impact of the informal economy on poverty by examining various responsiveness of the household's per capita income on earnings from informal sources.This responsiveness is suspected to be not uniform across all income levels, hence the normal OLS method is no longer suitable. The quantile regression results generally show that effect of informal earnings on household income is not large but statistically significant. Interquantile regression results reaffirm that influence of informal income is complicated and different between poor, middle and rich households. The results can be further explored according to three extents. First, the positive contribution of informal earnings to household income is larger for poor households. Second, informal income has no significant impact on households at the middle class when other variables are controlled. Third, for the richest households, informal income turns around to be the factor increasingly worsening economic capacity of the household.

In addition, the responsiveness of the household income to head's characteristics and demongraphic factors is also examined. With respect to head's nature, higher age of the head is related to higher household's level income but the relationship is non-linear. Education and vocational training of the head significantly improve household living standards while income in minority households is significantly lower than Kinh households. About demographic factors, we find that burden rate and household size both accelerate the poverty. Furthermore, area and regional inequality is observed at all level of income in the quantile regression.

On the whole, all empirical results from different methods support the positive view of the role of informality in poverty reduction in Vietnam. The impact of informal income on poverty reduction is statistically positive although it is various according to classes of households. Effects of other factors on household's poverty are quite similar between methods. Head's education helps to reduce poverty while an increase in household size, burden rate and living in the North West or the rural area make household's poverty situation become more serious.

Consequently, obvious evidence of the role of informal earnings in decelerating poverty probability and especially increasing incomein poor households suggests that poverty reduction programs should be closely link with the informal employment and the informal sector. In Vietnam condition, where a considerable proportion of labor force self-employs in household business and formalization is not effective enough to absorb labor from the informal sector, existence of the informal economy is inevitable. Thus, the government

should have supporting policies to decrease disadvantages of the informal sector and informal employment, especially the informal sector and informal employment yielding low income. Because it can be seen from the empirical results that people who directly benefit from support for the informal sector and informal employment are the poor.

Besides, poverty reduction program should target households in rural area, North West and North Central Coast, minority ethnicity where the poverty is more serious than in the counter parts. A special effort should be made so that education and training program, which consistently mitigate poverty, is reachable for the poor. As household size accelerates poverty situation, another action that Vietnamese government has already done and should continue is family planning.

Appendix

Table 4: Monthly income per capita by sources of income quintile and regions

<div align="right">Unit: 1000 VND</div>

	Total	quintile 1	quintile 2	quintile 3	quintile 4	quintile 5	Poverty rate
Urban	2,130	633	1,154	1,612	2,268	4,983	6.9
Rural	1,070	330	568	821	1,175	2,462	17.4
Red River Delta	1,568	468	818	1,159	1,663	3,733	9.4
North East	1,055	308	507	748	1,183	2,531	24.2
North West	741	239	368	536	826	1,736	39.4
North Central Coast	903	287	495	722	1,054	1,959	24.0
South Central Coast	1,162	371	627	876	1,256	2,682	16.9
Central Highlands	1,088	305	534	799	1,276	2,526	22.2
South East	2,165	629	1,106	1,582	2,220	5,293	3.4
Mekong River Delta	1,247	396	662	937	1,336	2,908	12.6

Source: GSO (2011)

Table 5: Variable description

Name of variable	Description	Mean	Std. Dev
Head sex		0.752	0.432
Head age		48.344	14.246
Square of head age		2540.090	1505.454
Head ethnicity	Dummy = 1 if Kinh, 0 otherwise	0.178	0.383
Head education	0 = no qualification, 1 = primary, 2 = lower secondary, 3 = higher secondary; 4 = college, 5 = university, 6 = MA, 7 = Phd	1.538	1.322
Head vocational training	Dummy = 1 if head experiences vocational training	0.117	0.321
Burden rate	Number of members under 15 or over 60/household size	0.234	0.239
Household size		3.937	1.566
Urban	Dummy = 1 if urban area, 0 otherwise	0.282	0.450
Red River Delta	Dummy = 1 if Northern East , 0 otherwise	0.196	0.397
North East	Dummy = 1 if Red River Delta , 0 otherwise	0.145	0.352
North Center Coast	Dummy = 1 if North Center Coast , 0 otherwise	0.104	0.305
South Center Coast	Dummy = 1 if Northern East , 0 otherwise	0.091	0.287
Central Highlands	Dummy = 1 if South Center Coast , 0 otherwise	0.069	0.254
South East	Dummy = 1 if South East , 0 otherwise	0.144	0.352
Mekong River Delta	Dummy = 1 if Mekong River Delta , 0 otherwise	0.203	0.402
Ln(informal income)	Natural Logarithm of informal income	5.133	5.041
Poor	Dummy = 1 if houshold is poor , 0 otherwise	0.104	0.305
Logarithm of household's per capita income		6.999	0.771

Source: author's calculation from VHLSS 2010

Table 6. Probit, Quantile and OLS Regression

|	Probit+	Quantile						OLS
	Poor household	Logarithm of household's per capita income						
		q10	q25	q50	q75	q90	
Head sex	-0.00668	0.00964	-0.0219	-0.0365**	-0.0221	-0.0594**	-0.0186
	(0.00581)	(0.0281)	(0.0242)	(0.0175)	(0.0204)	(0.0294)	(0.0148)
Head age	-0.00389***	0.0110***	0.0143***	0.0209***	0.0183***	0.0265***	0.0186***
	(0.000866)	(0.00417)	(0.00330)	(0.00305)	(0.00360)	(0.00538)	(0.00266)
Square of head age	2.44e-05***	-5.20e-05	-8.86e-05***	-0.00015***	-0.00012***	-0.00021***	-0.00013***
	(8.32e-06)	(4.05e-05)	(3.29e-05)	(3.04e-05)	(3.55e-05)	(5.38e-05)	(2.59e-05)
Head ethnicity	0.110***	-0.393***	-0.372***	-0.383***	-0.404***	-0.384***	-0.386***
	(0.0119)	(0.0324)	(0.0270)	(0.0259)	(0.0328)	(0.0412)	(0.0196)
Head education	-0.0266***	0.181***	0.193***	0.185***	0.177***	0.174***	0.185***
	(0.00233)	(0.0103)	(0.00778)	(0.00602)	(0.00625)	(0.0103)	(0.00544)
Head vocational training	-0.0385***	0.236***	0.205***	0.199***	0.185***	0.183***	0.212***
	(0.00548)	(0.0293)	(0.0281)	(0.0208)	(0.0268)	(0.0329)	(0.0196)
Burden rate	0.0615***	-0.405***	-0.325***	-0.321***	-0.262***	-0.166***	-0.298***
	(0.00881)	(0.0458)	(0.0375)	(0.0280)	(0.0345)	(0.0493)	(0.0259)
Household size	0.0101***	-0.0435***	-0.0655***	-0.0843***	-0.0862***	-0.0847***	-0.0753***
	(0.00142)	(0.00732)	(0.00638)	(0.00450)	(0.00565)	(0.00789)	(0.00414)
Urban	-0.0182***	0.354***	0.344***	0.314***	0.297***	0.308***	0.325***
	(0.00535)	(0.0227)	(0.0218)	(0.0177)	(0.0185)	(0.0258)	(0.0147)
Red River Delta	-0.0209**	0.0872*	0.116**	0.155***	0.143***	0.178***	0.147***
	(0.00837)	(0.0530)	(0.0460)	(0.0384)	(0.0494)	(0.0575)	(0.0341)
North East	-0.0105	-0.00782	-0.0106	0.00826	0.0141	0.0321	0.0107
	(0.00743)	(0.0493)	(0.0414)	(0.0329)	(0.0452)	(0.0483)	(0.0323)
North Center Coast	0.0215*	-0.236***	-0.178***	-0.157***	-0.172***	-0.189***	-0.170***
	(0.0123)	(0.0575)	(0.0478)	(0.0424)	(0.0520)	(0.0547)	(0.0356)
South Center Coast	-0.0165**	0.0512	0.0562	0.0597	0.0247	0.0445	0.0638*
	(0.00843)	(0.0570)	(0.0460)	(0.0392)	(0.0456)	(0.0662)	(0.0366)
Central Highlands	-0.0326***	0.154***	0.131***	0.131***	0.179***	0.268***	0.170***
	(0.00552)	(0.0573)	(0.0483)	(0.0406)	(0.0543)	(0.0694)	(0.0368)
South East	-0.0566***	0.382***	0.393***	0.404***	0.433***	0.507***	0.447***
	(0.00457)	(0.0471)	(0.0435)	(0.0378)	(0.0592)	(0.0540)	(0.0344)
Mekong River Delta	-0.0301***	0.151***	0.200***	0.238***	0.251***	0.312***	0.245***
	(0.00691)	(0.0472)	(0.0405)	(0.0353)	(0.0484)	(0.0530)	(0.0334)
Ln(informal Income)	**-0.00539*****						
	(0.000489)						
Dummy of informal income		**0.0928*****	**0.0534*****	**-0.00483**	**-0.0621*****	**-0.0723*****	**0.00105**
		(0.0218)	**(0.0181)**	**(0.0152)**	**(0.0160)**	**(0.0257)**	**(0.0127)**
Constant	0.0414	5.675***	6.027***	6.326***	6.764***	6.945***	6.334***
	(0.225)	(0.114)	(0.0867)	(0.0790)	(0.0995)	(0.128)	(0.0730)

*** p<0.01, ** p<0.05, * p<0.1, Standard errors in parentheses, + marginal effect is report

Table 7. Interquantile Regression

Household per capita income	q90-q10	q90-q50	q50-q10	q75-q25
Head sex	-0.0690**	-0.0229	-0.0461**	-0.000169
	(0.0334)	(0.0293)	(0.0233)	(0.0259)
Head age	0.0155**	0.00567	0.00984**	0.00398
	(0.00617)	(0.00565)	(0.00462)	(0.00474)
Square of head age	-0.000159***	-6.56e-05	-9.33e-05**	-2.65e-05
	(5.87e-05)	(5.53e-05)	(4.55e-05)	(4.64e-05)
Head ethnicity	0.00868	-0.00183	0.0105	-0.0322
	(0.0509)	(0.0381)	(0.0347)	(0.0328)
Head education	-0.00784	-0.0117	0.00388	-0.0156**
	(0.0133)	(0.0108)	(0.0103)	(0.00785)
Head vocational training	-0.0526	-0.0160	-0.0367	-0.0206
	(0.0436)	(0.0380)	(0.0326)	(0.0268)
Number of burden	0.239***	0.155***	0.0841*	0.0630
	(0.0673)	(0.0465)	(0.0430)	(0.0441)
Household size	-0.0411***	-0.000391	-0.0407***	-0.0207***
	(0.00967)	(0.00764)	(0.00755)	(0.00746)
Urban	-0.0465	-0.00611	-0.0404	-0.0469**
	(0.0329)	(0.0279)	(0.0260)	(0.0236)
Red River Delta	0.0908	0.0228	0.0679	0.0267
	(0.0747)	(0.0525)	(0.0548)	(0.0487)
North East	0.0399	0.0239	0.0161	0.0247
	(0.0631)	(0.0517)	(0.0490)	(0.0528)
North Center Coast	0.0468	-0.0322	0.0790	0.00599
	(0.0696)	(0.0545)	(0.0572)	(0.0519)
South Center Coast	-0.00664	-0.0152	0.00857	-0.0315
	(0.0760)	(0.0570)	(0.0553)	(0.0531)
Central Highlands	0.114	0.137**	-0.0226	0.0479
	(0.0799)	(0.0588)	(0.0537)	(0.0544)
South East	0.125*	0.103**	0.0220	0.0398
	(0.0641)	(0.0505)	(0.0541)	(0.0550)
Mekong River Delta	0.161**	0.0748	0.0862	0.0516
	(0.0683)	(0.0512)	(0.0551)	(0.0576)
Dummy of informal income	**-0.165***	**-0.0675**	**-0.0976***	**-0.116***
	(0.0315)	**(0.0263)**	**(0.0240)**	**(0.0199)**
Constant	1.270***	0.618***	0.652***	0.737***
	(0.169)	(0.138)	(0.130)	-0.12

*** p<0.01, ** p<0.05, * p<0.1, Standard errors in parentheses

Figure 1. Quantile and OLS Plots: Response of Explanatories on Household Per Capita Income
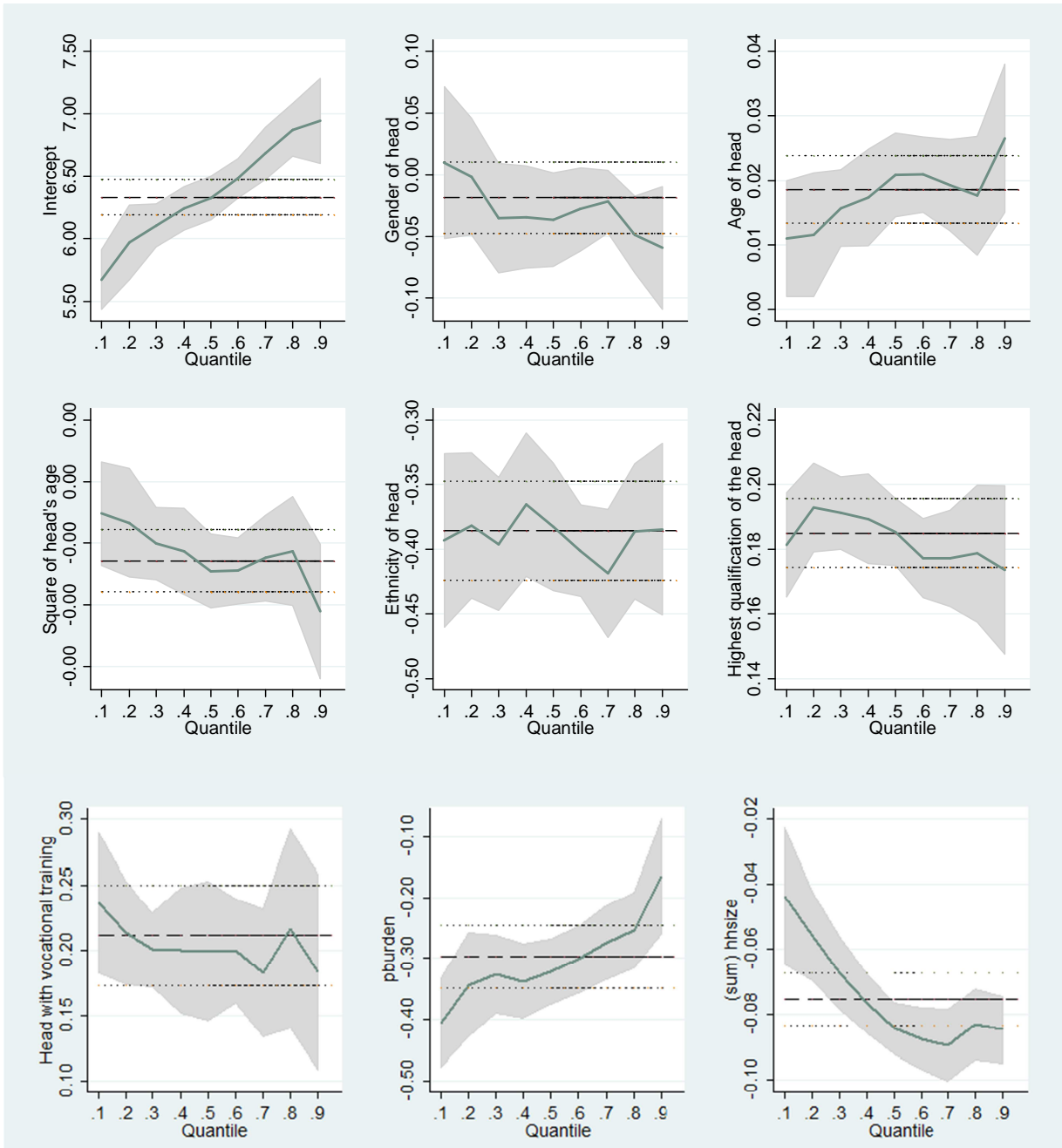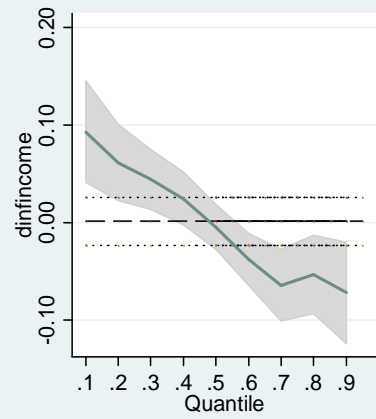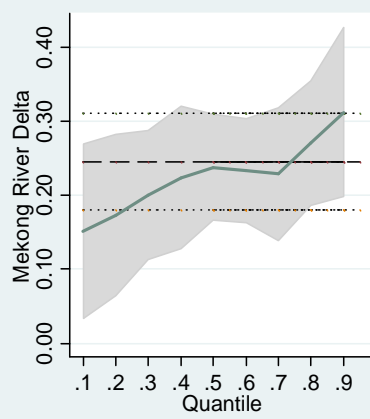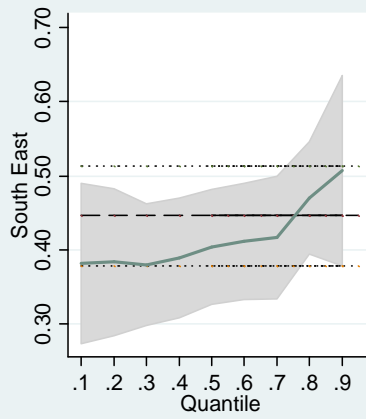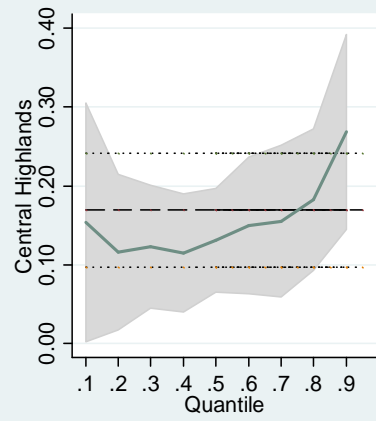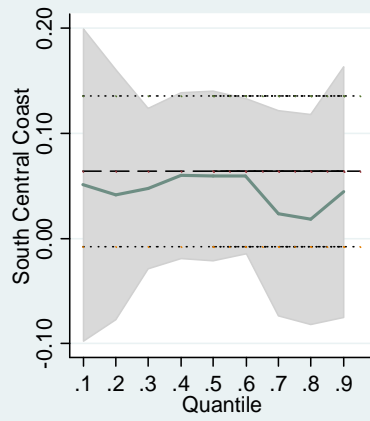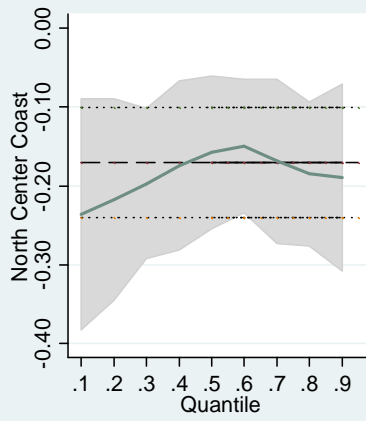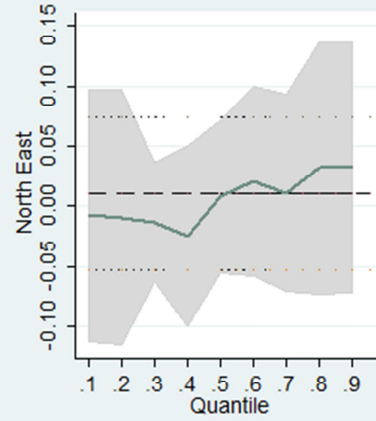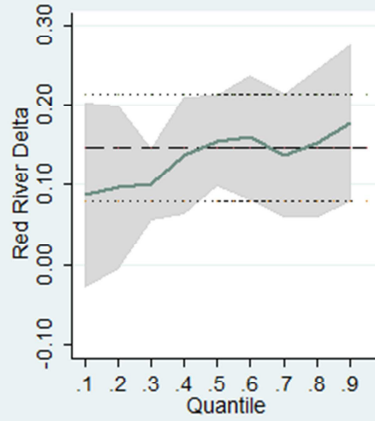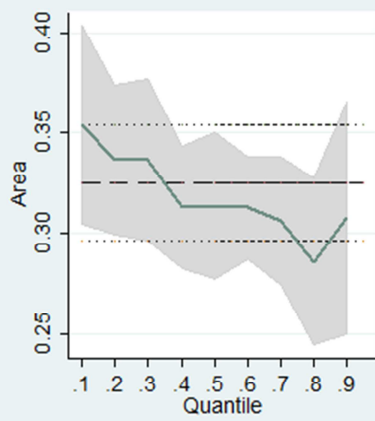
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