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FACTORS AFFECTING HOUSEHOLD INCOMES IN THE CENTRAL HIGHLANDS, VIETNAM: EVIDENCE FROM QUANTILE REGRESSION

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ABSTRACT

The paper studies the factors affecting the income of rural households in Vietnam in the Central Highlands, Vietnam. The study used both OLS regression methods and analytic percentile regression on a table dataset of 1,375 rural households in the Central Highlands from the Vietnam Rural Household Resource Access Survey (VARHS) in the period 2010 – 2018. The OLS regression method aims to determine the factors affecting the average income of households, the percentile regression method aims to determine the factors affecting the income of rural households on different percentiles. The results of the OLS regression estimate show that the group of social capital factors, the gender of the head of household plays an important role in household income. The results obtained in the percentile regression method show that there is a significant difference with the results of the OLS regression method on different micro tiles, especially male heads of households have a strong impact on income for low-income households in the 10% and 25% percentiles. The educational and religious level of the head of the household and the number of organizations that the household participates in are factors that strongly affect the income of households from low to high percentiles.

KEYWORDS:- Quantile regression, income, rural household.

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1. INTRODUCTION

Vietnam's rural areas have always been considered extremely strategically important in the country's development process, considered an inseparable core part in the process of promoting sustainable socio-economic development, not only in terms of the proportion of residential areas but also in terms of positive socio-economic contributions associations in our country in the current period. According to the General Statistics Office (2020), rural areas contribute 14.85% of national GDP, accounting for 63.2% of the country's population (61.65 million people). Statistics show that it is extremely important and necessary to focus on developing and improving the material and spiritual life of the population in rural areas. One of the ways to improve the material life of people is to increase income, reduce the income gap between urban and rural areas, between men and women.

The Central Highlands region suffers from the adverse effects of climate change; the policies of the State and localities with the household economy still have many inadequacies, there is no worthy investment; affected by the difficulties of the international market. The type of household economy in the region in recent years still has many limitations, development is not commensurate, the growth rate is not commensurate with the available potential, the production scale is still small, fragmented, not many achievements of science and technology have been applied, products made are of low quality, etc poor design, poor competitiveness. Most of the heads of households and workers have not been trained, still carry heavy small production habits, and have not been actively integrated with the market mechanism.

In the world and Vietnam, there have been quite a lot of studies on factors affecting household income. The results of the study show that the identification of factors affecting farmer households plays an important role in proposing recommendations to improve household income and living standards. In Vietnam, studies on farmers' incomes are mainly concentrated in small areas such as districts or provinces, and there are few studies in large areas, especially in the Central Highlands provinces - where the economy and income are low in Vietnam. On the other hand, most studies use the OLS regression model to analyze the factors affecting the average household income, very few studies use the percentile regression method to consider the factors affecting the income of households in the Central Highlands on different percentiles. Therefore, it is extremely important and necessary to "Analyze factors affecting the income of households in the Central Highlands, Vietnam by the percentile regression method".

2. LITERATURE REVIEW

Studies using household data (Hassan & Babu, 1991; Lanjouw&Ravallion, 1995; Simler et al., 2003; Otsuka &Yamano, 2006; Kaur et al., 2003) argue that the main factors affecting household income include household size, age and gender of household members, household composition, education level, social capital, area of productive land, among others.

Household income is affected by key factors such as age, gender, demographic size of the household, ethnic composition of the household, education level, land size, social capital, assets, employment, income from the non-commercial sector (Benin &Randriamamonjy, 2008; Fadipe et al., 2014; Imam & et al., 2018). In addition, studies by Abdulai and CroleRees (2001), De Janvry and Sadoulet (2001), Yang (2004), Démurger et al. (2010), Klasen et al. (2013), Yu and Zhu (2013)

found that household income is affected by many factors such as: area of productive land, capital, education level, etc work experience, number of employees and market access,... Research by Artha and Dartanto (2018), Gounder (2013), Lekobane and Seleka (2017), Ogutu and Qaim (2019), Ravindra Deyshappriya and Minuwanthi (2020) found a direct relationship between household size and household income.

The ethnic composition of the head of the household is also considered the main determinant of income and poverty of the household. Ethnic minority households are much poorer than ethnic minority households in most countries (Barnard & Turner, 2011). Education level and household size have an impact on household income (Farzam et al., 2021).

Human capital has long been identified as the asset of every country and is one of the four resources that generate economic growth. According to Scully (2002), human capital is directly related to economic growth and this relationship can be measured by the amount of money invested in human education. Shahpari and Davoudi (2014) argue that an increase in human and material capital can reduce inequality and help distribute income more equitably.

Accordingly, human capital can help workers improve their productivity, increase their ability to find work, and increase their personal income (Koch & McGrath, 1996; Vinokur et al., 2000; Dong & Hue, 2019). Human capital can positively impact the capacity and competitiveness of enterprises (Lepak & Snell, 1999; Arthur, 1992, 1994). Human capital is also the driving force, the foundation for promoting economic growth in depth based on machinery and technology (Mincer, 1981; Affandi, Anugrah, & Bary, 2019). Kaur et al. (2018), Farzam et al. (2021) indicate that education level has an impact on household income. Ghanaian and Nicaraguan studies show that higher levels of education are associated with an increased probability of participation in non-agricultural activities (Yunez-Naude & Taylor, 2001; Abdulai & Delgado, 1999). According to Garza-Rodríguez (2015), education increases an individual's human capital and this greater capital increases their productivity and income. Many studies have found strong empirical evidence to support this hypothesis (Biyase & Zwane, 2018; Islam et al., 2017; Lekobane & Seleka, 2017; Peng et al., 2019).

Rural households' access to credit is an important factor in promoting agricultural production and transformation. Human loans are one of the important factors affecting household income (Abdulai & Crole-Rees, 2001; Démurger & et al. (2010); De Janvry & Sadoulet, 2001; Yang, 2004; Le Dinh Hai, 2017; Ogah, 2020).

According to Lewis (1954) and Oshima (1993), the size of the agricultural land area of the household affects the income of the farmer household. Similarly, according to the studies of Abdulai and Crole-Rees (2001), Démurger et al. (2010), De Janvry and Sadoulet (2001), and Yang (2004), farmers' incomes are influenced by land factors. Research by Lhing et al. (2013), Le Dinh Hai (2017) said that the factor of the production land area of farmers affects the income of the head of the household. Manjunatha et al. (2013) believe that in agricultural activities, the size of land will have a positive impact on the income of farmers.

There are many studies by many other authors at home and abroad that have proven that social capital and farmers' income are closely related (Narayan & Pritchett, 1999; Yusuf, 2008; Sun et al., 2014). Research by Sun et al. (2014) suggests that social capital also affects their ability to improve their income, providing them with job opportunities and advancement. High social capital they are likely to improve the income affordability of households (Narayan & Pritchett, 1999; Tran Tien Khai & Nguyen Ngoc Danh, 2014).

3. METHODS AND DATA

3.1. Methods

The determinants of household income are estimated using the percentile regression method. The percentile regression approach has the advantage of allowing parameter variation between the percentiles of the income distribution. Previous studies have often used the conventional least squared (OLS) method, to study household income determinants (Eshetu, 2020), this approach simply estimates the conditional mean of household income variables for a set of explanatory variables. The resulting coefficients are the marginal effects of the corresponding variables at the conditional mean. In other words, the estimated coefficients according to the OLS method represent the mean change in the response variable in relation to the change in the relevant explanatory variable. In this regard, the OLS method may not be suitable when dealing with extreme values and foreign values in the distribution of dependent variables.

The advantages of percentile regression over OLS regression have been clearly discussed in economic theory. Estimation coefficients of percentile regression are insensitive to the external values of dependent variables, and percentile estimation is more efficient than OLS when errors are not canonically distributed (Buchinsky, 1998). The percentile regression method also allows researchers to pre-determine any location of the distribution according to their specific requirements (Hao and Naiman 2007).

3.2. Data

The study was conducted based on data from the Vietnam Rural Household Resource Access Survey (VARHS) in the period 2010 - 2018. The scope of the study is the Central Highlands region including the provinces of Dak Lak, Dak Nong and Lam Dong. From this dataset, the author filtered out the data of households with income. At the same time, filter out the necessary variables for their research model. After filtering the data, the observations with no income and the observations with insufficient data are removed, and the data is used for the research model.

Research Model

The study model looks like: $Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + \dots + b_{11}X_{11} + b_{14}X_{14} + e$

In which: The dependent variable Y is the logarithm of the average annual income of the household. Variables $X_1, X_2 \dots X_{14}$ are independent variables (explanatory variables).

Table 1: Definition of factors affecting the income of rural households

Variable	Variable name	Explain
X_1	Sex	Gender of household head is a dummy variable (1 – Male; 0 – Female)

X ₂	Age	Age of the head of household in years
X ₃	Education	Educational level of the head of the household: years of schooling
X ₄	Ethnic	Ethnicity of household head is a dummy variable (1 – Kinh; 0 – other)
X ₅	Marriage	Household head's marriage is a dummy variable (1=yes; 0=no)
X ₆	Dependency ratio	Dependency Ratio
X ₇	Land area	Household production land area (1,000m ²)
X ₈	Loan	The amount of money that households borrow from official institutions
X ₉	Distance from the road	Distance from the house to the nearest asphalt road
X ₁₀	Number of shocks	Number of shocks such as floods, cyclones, droughts
X ₁₁	Number of organizations	Number of organizations and associations that households participate in
X ₁₂	Expense	The amount of money a household contributes to an organization or association of which the household is a member.
X ₁₃	Relationship	Fake variables for heads of households with acquaintances working in the government apparatus (1 – yes; 0 – no)
X ₁₄	Rely	The head of the household can rely on someone when he needs money (1 – yes; 0 – no)

4. RESULTS AND DISCUSSION

The results of regression of table data by the OLS method after multi-collinear testing, testing of autocorrelation phenomena and overcoming the phenomenon of variable variance showed that all explanatory variables were meaningful at 1% except for the age variable of the head of the household which was meaningful at 5% and 04 explanatory variables with no statistical significance, including: marital status, distance from home to asphalt, number of shocks and variable costs of participating in organizations and associations.

Although percentile regression can be estimated from the 0.01 percentile to the 0.99 percentile with any jump, due to the software's processing time and speed limitations, the study only performed regressions at the basic percentiles 0.1 – 0.25 – 0.5 – 0.75 – 0.9. The regression results at these basic percentiles are enough as a basis for the topic to make analyses and recommendations, the higher the percentile corresponds to the higher the average income of the head of household.

Regression results by least squares method (xtgls) and percentile regression method (10%, 25%, 50%, 75% and 90%) are presented side-by-side in the same result table to show the advantages of percentile regression.

Table 2: Income regression results of households in the Central Highlands in the

period 2010-2018

Independent variables	xtgls	Percentile Regression				
		Q10	Q25	Q50	Q75	Q90
Gender Head of Household	0.302***	0.472***	0.390***	0.278**	0.236**	0.005
Age of Head of Household	-0.003**	-	-0.002	-0.004	-0.004	-0.002
Education	0.035***	0.021***	0.037***	0.031***	0.036***	0.042***
Household Ethnicity	0.431***	0.377***	0.349***	0.441***	0.410***	0.559***
Marriage	0.050	-0.095	0.003	0.101	0.089	0.192
Dependency Rate	-	-	-	-	-	-
Production land area	0.173***	0.188	0.183***	0.177***	0.217***	0.214***
Loan amount	0.005*	0.004	0.009*	0.004	0.003	0.010
Distance	-0.001	-0.009	-0.008	0.000	-0.003	-0.003
Number of shocks	-0.024	-0.020	-0.023	-0.041*	-0.045	-0.055
Number of Participating Units	0.234***	0.328***	0.288***	0.235***	0.201***	0.199***
Cost of Participation	0.000	0.000	0.000	0.000	0.000	0.000
Relationship with CQ	0.112***	0.258***	0.114**	0.121**	0.118**	0.175**
Rely on	0.264***	0.324**	0.406***	0.320***	0.089	0.021
Constant	9.342***	8.127***	8.303***	9.065***	9.220***	9.394***
N	1,375	1,375	1,375	1,375	1,375	1,375

*, **, ***: meaning 10%, 5%, 1%

(Source: Regression results using Stata 17 software)

The results of Table 2 show that, for the OLS regression method, the gender of the head of the household is statistically significant at 1%, which is related to the household income. For the percentile regression method, it is possible to determine the impact of the gender of the head of the household on the income distribution at the low percentiles of 10%, if the head of the household is male, the average income will increase compared to the average income of the female head of the household and continue to increase at the 25% percentile. This shows that women often have difficulty accessing resources such as capital, land, technology, and women's social role may be bound by family responsibilities, leading to less time and opportunities to participate in economic activities. The results of this estimate are similar to those of Datt et al. (2000), Fadipe et al. (2014), Imam et al. (2018). However, at the 90% percentile, the gender of the head of the household is not statistically significant.

The education level of the head of household is statistically significant at 1% and the regression coefficient is marked (+), so there is a covariate relationship with the income of the household in both models. The results of the percentile regression model show that the average household income gradually increases at the high percentile. In rural areas, education has more impact on high-income households.

This also shows the importance of education level in the income of rural households in the Central Highlands in particular; Vietnam in general, in rural areas education is more valuable for high-income people. The results of this estimate are similar to the research results of Tran Quang Tuan (2015),

The estimated results from the percentile regression method also show that the heads of households who are Kinh ethnic groups have an income level compared to the heads of households belonging to other ethnic sub-ethnicities and gradually increase from low to high percentiles. assets are clearer, making it easier for them to invest and produce than other people. In addition, the literacy rate and education level of Kinh people are usually higher, making them able to apply new techniques and improve labor productivity. Moreover, ethnic minority groups are more vulnerable to economic fluctuations than Kinh households. This study gives similar results to the research results of Fadipe et al. (2014), Tran Quang Tuyen (2015), Tran Dinh Thao et al. (2022).

In contrast to the above factors, the dependency factor has the opposite effect on household income. This result is similar to the research results of Tran Quang Tuyen (2015), Tran Dinh Thao et al. (2022). This shows that a high dependency rate will lead to more people depending on household income, increasing financial pressure. This can lead to a decrease in the ability to save and invest in production or education. On the other hand, if many members of the household do not participate in labor (such as children, the elderly, or the sick), the income of the household will be negatively affected. This is especially true in rural areas where income is largely dependent on agricultural activity. In conclusion, high dependency rates can reduce the ability of households to earn income and economic development in the Central Highlands, creating major challenges in improving lives and raising incomes.

5. CONCLUSION AND RECOMMENDATIONS

The study used table data of 1,375 rural households in the Central Highlands, Vietnam in the period 2010-2018 to analyze factors affecting household income. The study has shown that factors that have an impact on household income in the Central Highlands region include factors that have a positive impact such as: gender, education level, ethnic composition, area of productive land, loans, number of participating units, etc relations with the government, reliance and factors affecting the opposite such as: dependency rate. From the results of the analysis of factors affecting the income of households in the Central Highlands, some recommendations to improve income as well as living standards and economy for households need to be implemented as follows:

Firstly, promote education and training to improve the educational and technical level of the people in the Central Highlands

Education and professional qualifications have a strong impact on household income, so improving education levels will contribute to increasing household income. The Central Highlands is a region with a very low intellectual level and the highest illiteracy rate in the country. So far, the percentage of people with a high school education is increasing, but it is still lower than in other regions. From there, the problem that needs to be raised is to continue to study guidelines and policies to support improving the education and skills of people, especially young people and school-age children. To help people improve their literacy, the Government should improve educational infrastructure and educational equipment. Local governments also need to provide special support to the poor, ethnic minorities, disadvantaged people and teachers working in the region. In addition, it is necessary to open training classes on agricultural production science, use of machinery and transfer of science and technology to farmer households.

Secondly, strictly implement the family planning population policy

The results of the study have shown that if the dependency rate is high, it will have an inverse effect on household income. Therefore, the application of family planning measures will help households control the population at an appropriate level, thereby improving the lives of households in a better direction. However, in order to achieve this, households need the help of local authorities and social organizations in propagating and guiding methods of family planning effectively such as each family should only have one to two children. educate and raise children with knowledge and good health in order to improve the quality of the breed and develop a stable population. Implement support policies for households with children, such as tuition subsidies and childcare subsidies, to reduce the financial burden and encourage labor participation.

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