THE EFFECT OF RESOURCES ON THE FAMILY INCOME OF HOUSEHOLDS IN DINH HOA DISTRICT OF THAI NGUYEN PROVINCE, VIETNAM

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SUMMARY

This paper studies the effect of resources, such as labor, capital and land to total income of agricultural household in Dinh Hoa district, Thai Nguyen province inside two group of people, Kinh and minority ethnics as well as between two year, 2007 and 2011. The results indicate all labor, capital and land have strongly effect on household income. In this district, Kinh ethic households have higher income than minority. The results also prove that the welfare of Dinh Hoa farmers are more and more improving by the time, with the household income in 2011 is nearly 1.9 times higher than in 2007.
Keywords: *Dinh Hoa district, Thai Nguyen - Viet Nam, household, resources, family income*

INTRODUCTION

Dinh Hoa, an official unit and the poorest district of Thainguyen province, is one of the poor districts in Vietnam. Located in the North East highly mountainous area with the population is approximately 90,000 living in a natural area of 520.75km^2. With more than 80% of population live and work in mountainous agricultural regions The main products of this district are tea material, forest, and fruit - tree products. However, these products' values are small because of low productivity and low technology There have been some surveys about the welfare of agricultural families in Dinh Hoa district, includes Ford Foundation and Thai Nguyen University projects. The results from these surveys show that by receiving the funds and technical support from World Bank, Vietnam government and some non - government organizations in transferring economic structure,by applying technology in production, the lives of farmers in this district are improving gradually.

Improving living household is always received the interest of the governments and institutes around the world. Specially, in developing countries, the most interested problem is how to increase the welfare of population live in rural areas. In Vietnam, there have been many programs and projects which support to living households in rural areas, such as New Rural Program, 135 Program, fresh water project and many other projects from the domestic and international organizations, which concentrate in training labors, transfer the technology and skills to farmers, to reduce the poverty. There have been many researchers concern about the living household of agricultural family in developing countries. Yang - Ming Chang, Bing - Wen Huang, Yun - Ju Chen (2012) studied the relationship between labor supply, income, and welfare of the farm household. Xuehua Shi, N. Nuetah, Xian Xin (2010) studied household income mobility in rural China. Taylor, J.E., Adelman, I., (2003) mentioned about agricultural household models, include genesis, evolution, and extensions. Anderson, D., Leiserson, M.W., (1980) published the paper about rural nonfarm employment in developing countries, which assessed the effect of employee amount and ability to the efficiency of agricultural production.

OBJECTIVE

This study purposes in assessing the increase of living farmers' household and some factors might affect to it in one of the poor districts in

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Vietnam. It also proves and assesses the effect of labor, capital, land area which used in producing agricultural products to total income of agricultural households in Dinh Hoa district, and assesses the difference of total income between major ethnic families, who usually have high education and intuitive, and the minorities, who tend to stop studying at low education. All of the assessments in this study were for the year 2007 and 2011

METHODOLOGY

Data collection

In 2006 and 2010, Vietnam General Statistic Office did the survey about agriculture and rural areas of Vietnam. One of this survey's results supplied the total households live and work in agricultural fields in Vietnam.The data, which used to assess the effect of labor, land area, capital to total income of agricultural households in Dinh Hoa districtwas collected fortwo years, 2007 and 2011

Sample size

This study gained data with 384 observations for both two years 2007 and 2011, by using simple random sampling which introduced by Cochran, W.G. (1977), and applying the formula

$$n = \frac{Z^2_{(1-\alpha/2)} P(1-P)}{d^2} \qquad (1)$$

P: estimate probability.
d: the confident limit around the point estimate
Z: score respected to desired statistical significance
n: sample size.
In this case, with 5% significance level, P, d and Z is estimated equal to 0.5, 0.05 and 1.96 respectively. Applying (1),

$$n = \frac{1.96^2 * 0.5(1-0.5)}{0.05^2} = 384.1$$

Research Question

(1) What are the influences of agricultural land area, number of agricultural labors in household, and capital to rural household income?

(2) Does the awareness ability affect to the increase in living households?

(3) Are the living households of farmer in Dinh Hoa district in 2011 better than in 2007?

Model

Variables

INC: Total income of agricultural household (USD unit)

SQMT: Agricultural land area in square meter

LAB: Number of labors work in agricultural household.

CAP: The capital used to product in the year (USD Unit).

ETH: An indicator variable, used to show the difference in total income between Kinh ethnic and the minorities

YEAR: An indicator variable, used to show the difference in total income of agricultural family income in two – studies year, 2007 and 2011

Model

Refer to the relationship between resource factors and agricultural family income, INCOME is expected increase through time, and the influence of land area, number of labor and capital are positive, and Kinh ethnic is expected to have higher income than the minorities. Thus, in this study, the model should be log – linear model to reflect more exactly how those factors affect to income, and the signs of all coefficients are expected to be positive. The estimated model should be: $\ln INC = \beta_1 + \beta_2*SQMT + \beta_3*LAB + \beta_4*CAP + \beta_5*ETH + \beta_6*YEAR + e_i$ **(2)**

RESULTS

Using least squares estimation for **(2)**, the estimated least squares parameters are expressedas below:

lnINC	= 6.027	+ 9.7E-06SQMT
t-value	59.5261	3.932
p-value	0.0000	0.0001
	+ 0.122LAB	+ 0.0003CAP
t-value	5.4832	7.7953
p-value	0.0000	0.0000
	+ 0.184ETH	+ 0.663YEAR
t-value	3.0559	11.4738
p-value	0.0024	0.0000

(3)

Adj-R^2 = 44.26

The estimated residual is denoted $\hat{e}$,

The result suggested that all agricultural land area, number of labors work in household and the capital used for production have positive effect on the level of agricultural household's income. The average income of Kinh ethnic household is higher than the average income of the minority ethnic household. Similarly, the average household's income in 2011 is higher than the average household's income in 2007.

From the estimated least squares results, all of the expected signs for respective coefficients are responded. The p-value of t test for each coefficient of estimated model (3) is also smaller than significant level 5%, thus, all these coefficients are statistically significant. However, some tests should be performed to ensure that all of model assumptions are held for least squares estimation.

Test heteroskedasticity

The nature of heteroskedasticity is the variances var($INCOME_i$) for all observations are not the same and the explanatory variables create the fluctuation of variances. In such these cases, var($INCOME_i$) and var(e_i) are not constant any more, and the assumption (3), the variance of the probability distribution of INCOME and error term does not change with each observation, is not held for least squares estimation.

Apply White test for hetoroskedasticity with the null hypothesis that the variance of errors[var(e_i)] is constantwith all against the alternative hypothesis that the var(e_i) is depended on explanatory variables and different for each observation i differ from j

H_0: var(e_i) = σ^2 for all i against H_1: var(e_i) ≠ var(e_j) for i ≠ j

The result given by White – test is showed in table 1

From table 1, the results show that both p-values for F-statistic and Chi-square equals to 0.0000. Thus, H_0 is rejected and heteroskedasticity exists with the variance depends on explanatory variables

Test the correlation between explanatory variables and the error term

From estimated model (3), the correlation analysis is expressed in table 2.

The correlations between each pair of SQMT, LAB and CAP with the errors RESID approximately equal to zero, or practically zero. In other way, SQMT, LAB,CAP, ETH and YEAR are smallcorrelated each other and uncorrelated with the errors. The assumption (5) of the model,the explanatory variables are independent anduncorrelated with the errors, is held

Another way, applying test for auxiliary models, estimate by least squares for all explanatory variables with estimated least squares residual $\hat{e}$ of model(3), all the p-values of t-test for the coefficients are 1.0000, greater than significance level 5%, and R^2 equals zero. Thus, all of the coefficients of estimated residuals in five above auxiliary models are insignificant different from zero and there are no longer any correlation between SQMT, LAB, CAP, ETH and YEAR with the errors (more in appendix 1)

Jarque-Bera test for normality

In this part, the Jarque-Bera test is suggested to test whether assumption 6, the random errors *e* have normal probabilitydistributions, $e \sim N(0, \sigma^2)$, is hold. The null hypothesis is that the regression errors are normally distributed

From figure 1, Jarque-Bera statistic has p-value equals to 0.0656. With 5% level of significance, this p-value is higher than 0.05. Thus, null hypothesis is not rejected, and the regression errors are normally distributed

Table 1. *White - test for Heteroskedasticity*

White - test			
F-statistic	3.715608	Prob. F(18,365)	0.0000
Obs*R-squared	59.46611	Prob. Chi-Square(18)	0.0000
Scaled explained SS	72.81228	Prob. Chi-Square(18)	0.0000

Table 2. *Correlation analyses between variables and the errors from model 3*

	RESID	SQMT	LAB	CAP	ETH	YEAR
RESID	1.000000	-4.70E-15	1.16E-14	8.83E-15	-1.34E-15	6.66E-16
SQMT	-4.70E-15	1.000000	0.080212	-0.001964	-0.129166	-0.151076
LAB	1.16E-14	0.080212	1.000000	0.083489	-0.063976	0.068858
CAP	8.83E-15	-0.001964	0.083489	1.000000	0.130825	0.207168
ETH	-1.34E-15	-0.129166	-0.063976	0.130825	1.000000	-0.020544
YEAR	6.66E-16	-0.151076	0.068858	0.207168	-0.020544	1.000000

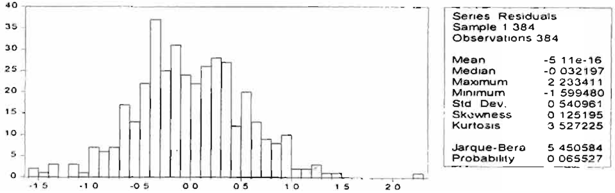

Figure 1. *Eviews output. Residual histogram and summary statistics of model (4.0)*

Generalized least squares estimator (GLS)

The White-test for heteroskedasticity concludes that variances σ_i^2 can be different for each observation. Thus, Feasible GLS(FGLS) estimator should be used in estimating the model (2), and the assumption for variance should be

With estimated model(3):

lnINC = 6.027 + 9.7e-06SQMT + 0.122LAB + 0.0003CAP + 0.184ETH + 0.663YEAR (3)

The least squares residual of (3) is $\hat{e}_i^2$

Apply least squares for $\hat{e}_i^2$ and the three explanatory variablesSQMT, LAB and CAP to gain the model as below: $Ln(\hat{e}_i^2) = \alpha_1 + \alpha_2 SQMT + \alpha_3 LAB + \alpha_4 CAP + v_i$ (4)

The estimated model for $\hat{e}_i^2$ is $\hat{\sigma}_i^2$ = log(EF^2) = -2.34 + 1.2e-06SQMT - .043*LAB + 0.0001*CAP (5)

From (5), the variance estimates will be $(SD)^2$

$$(SD)^2 = \exp[\hat{\sigma}_i^2]$$

Usingfeasible generalized least squares with weights define by $(SD)^{-1}$ for (2). The results showed in the table 3:

Table 3. *Estimated generalized least squares results of model (2)*

Dependent Variable LOG(INCOME), Method Least Squares, Obs. 384

Weighting series 1 (SD)

Var	Coefficient	Std Error	t-Statistic	Prob
C	6.013	0.0998	60.2359	0.0000
SQMT	9.7E-06	2.6E-06	3.7474	0.0002
LAB	0.120	0.0216	5.5724	0.0000
CAP	0.0003	4.1E-05	7.9253	0.0000
ETH	0.180	0.0599	3.0088	0.0028
YEAR	0.629	0.0579	10.8766	0.0000
	Weighted Statistics			
R-squared	0.4526	Mean dependent var		7.1461
Adjusted R-squared	0.4454	S.D. dependent var		0.7223
F-statistic	62.5123	Durbin-Watson stat		1.8778

Table 4. *Breusch-pagan-Godfrey test for Heteroskedasticity*

Heteroskedasticity Test Breusch-Pagan-Godfrey

F-statistic	0.661319	Prob F(5,378)	0.6530
Obs*R-squared	3.329953	Prob Chi-Square(5)	0.6493
Scaled explained SS	3.868601	Prob Chi-Square(5)	0.5685

Table 5. *Ramsey RESET Test for the model misspecification*

Ramsey RESET Test

Specification LOG(INCOME) C SQMT LABOR CAPITAL ETHNIC YEAR

Omitted Variables, Squares of fitted values

	Value	df	Probability
t-statistic	2.1296	377	0.033
F-statistic	4.5781	(1, 377)	0.033
Likelihood ratio	4.6351	1	0.031

Using Jarque – Bera test the normality of the errors from GLS estimator for Model **(2)**, p-value of Jarque-Bera test equals to 0.1179 is bigger than 5% level of significance. Thus, model **(2)** errorsestimated by FGLSare normally distributed (results are in appendix 2)

Breusch – Pagan – Godfrey Test for Heteroskedasticity should be used to test the null hypothesis that FGLS estimators for model**(2)**has constant variance in errors

The results from table 4 show that probability of Chi-square, p-value = 0.6493, is greater than significance level 5%. Thus, the null hypothesis is not rejected and Feasible GLS estimators for model **(2)** has constant variance in errors

From there, all the important assumptions for GLS estimation are held. With weight defined by $(SD)^{-1}$, the estimated model of **(2)** is:

lnINC = 6 013 + 9.7e-06*SQMT + 0.120*LABOR + 0.0003*CAP + 0.18*ETHNIC + 629*YEAR **(6)**

(i). Interpretation for estimated model (6):

The results table 3 also shows that the probabilities of t–test for all coefficients are smaller than significance level 5%. thus, all of these coefficients of model(6) are statistically significant This estimated model also has the smallest information criterion Akaike (AIC), whichis 1.614. This information implies that the estimated model **(6)** with GLS is better than the estimated model **(3)** without weighted series

And, we use generalized $\bar{R}^2$ to measure the fluctuation of INC is affected by the explanatory variables.

We call INCF is the prediction of INC. $\bar{R}^2$ is calculated that equals to the squares of correlation between INC and INCF, $r_{INC,INCF}$ From the estimated model **(6)**, the correlation between INC and INC, $r_{INC,INCF}$ = 0 5026 Thus, $\bar{R}^2_g$ = $r^2_{INC,INCF}$ = 0.2527. It means that 25.27% of variation in agricultural household income is explained by the explanatory variables within the regression model

SQMT. The agricultural household income (AHI) will increase 0 098% responded to 100 square-meter increase in agricultural land area

LAB The AHI will increase 12.18% with 1 person increase in the number of labors work in agricultural household

CAP. The AHI will increase 0 03% with 1 unit increase in the amount of capital used in production

With two indicator variables.

ETH The Kinh household income is $100(e^{0.18} - 1)$ = 19 6% higher than minority ethnic household income.

YEAR The average household's income in 2011 is $100(e^{0.629} - 1)$ = 87 55% higher than the average household's income in 2007

(ii) Testing for the model misspecification

Regression Specification Errors Test (RESET) will be designed to detect omitted variables and incorrect functional form. The null hypothesis is that the model **(2)** omits relevant variables or has incorrect form. RAMSEY RESET Test results is showed in table 5.

From the results in table 5, probability of t – statistic (and F – statistic) is 0.033, smaller than 5% level of significance. Thus, the null hypothesis is rejected. implied that the original model is inadequate andstill might be improved.

CONCLUSION

This report confirms the effect of some factors include agricultural land area, labors. capital and ethnic to the agricultural household income in the poorest district of Thai Nguyen province, Vietnam in two year 2007 and 2011.However. from the value $\bar{R}^2$ equals to 0.2527 and Ramsey RESET test results in table in table 5, which showed that the original model is inadequate and can be improved, there may exists some other variables that also affect strongly to household income. Despite of it. through 384 observations in sample size represent for nearly 90 000 people (more than 80% of them work in agricultural sector), generalized least squares pointed out some important results about the effect of agricultural land area, labors and capital to household income in Dinh Hoa. And this results also prove that the welfare of Dinh Hoa farmers are more and more improve by time. with the household income in 2011 is nearly 1.9 times higher than in 2007

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TÓM TẮT

TÁC ĐỘNG CỦA MỘT SỐ NGUỒN TÀI NGUYÊN TỚI THU NHẬP CỦA HỘ GIA ĐÌNH Ở HUYỆN ĐỊNH HÓA TỈNH THÁI NGUYÊN, VIỆT NAM

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Bài viết này nghiên cứu ảnh hưởng của các nguồn tài nguyên, chẳng hạn như lao động, vốn, đất đai tới tổng thu nhập của hộ gia đình nông nghiệp ở huyện Định Hóa, tỉnh Thái Nguyên trong hai nhóm người, người Kinh và người dân tộc thiểu số cũng như giữa hai năm 2007 và 2011. Kết quả cho thấy tất cả các yếu tố như lao động, vốn và đất đai có ảnh hưởng mạnh mẽ đối với thu nhập của hộ gia đình. Ở khu vực này, các hộ gia đình dân tộc Kinh có thu nhập cao hơn so với các hộ dân tộc thiểu số. Các kết quả này cũng chứng minh rằng điều kiện kinh tế của các hộ nông dân huyện Định Hóa đang ngày càng cải thiện theo thời gian, với thu nhập hộ gia đình trong năm 2011 cao hơn năm 2007 gần 1,9 lần.
Từ khóa: *Thái Nguyên, Việt Nam, huyện Định Hóa, hộ gia đình, nguồn lực, thu nhập hộ gia đình*

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