Income Changes in Association with Land Expropriation in Giang Điền Industrial Park, Đồng Nai Province

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ABSTRACT

Land expropriation seems inevitable during industrialization and modernization. The expropriation of land affects greatly personal income of local residents. The research employs sustainable livelihoods framework suggested by DFID (2003) to analyze effects of land expropriation on local residents in Giang Điền Industrial Park (Trảng Bom District, Đồng Nai Province). The results identify four following factors that affect personal income: (1) ability to turn compensation into investments; (2) area of land expropriated; (3) education level of householder; and (4) dependence ratio.

1. INTRODUCTION

According to statistics from the Ministry of Agriculture and Rural Development (2009), there are each year approximately 73,000 hectares of expropriated agricultural land that changes the lives of 2.5 million people; 70% of lawsuits in Vietnam is in connection with land expropriation, which may be evidence of people's dissatisfaction. Therefore, does personal income increase or drop with land expropriation? This is the central question of this article which is structured into the following sections: (1) Theoretical framework and research model; (2) Descriptive statistical analysis comparing factors affecting the change in income; and (3) Binary Logit Regression model and policy implications.

2. CHANGES IN INCOME AND RESEARCH MODELS

There exist many studies of income change due to changes in living conditions. For instance, ADB (1995) suggests that personal livelihood and income are taken into account during land expropriation; WB (2004) offers specifically measures to support those who undergo land expropriation such as job creation, credit provision, and other economic measures. The following analytical framework of sustainable livelihoods is based on the one suggested by Department for International Development, UK (2003):

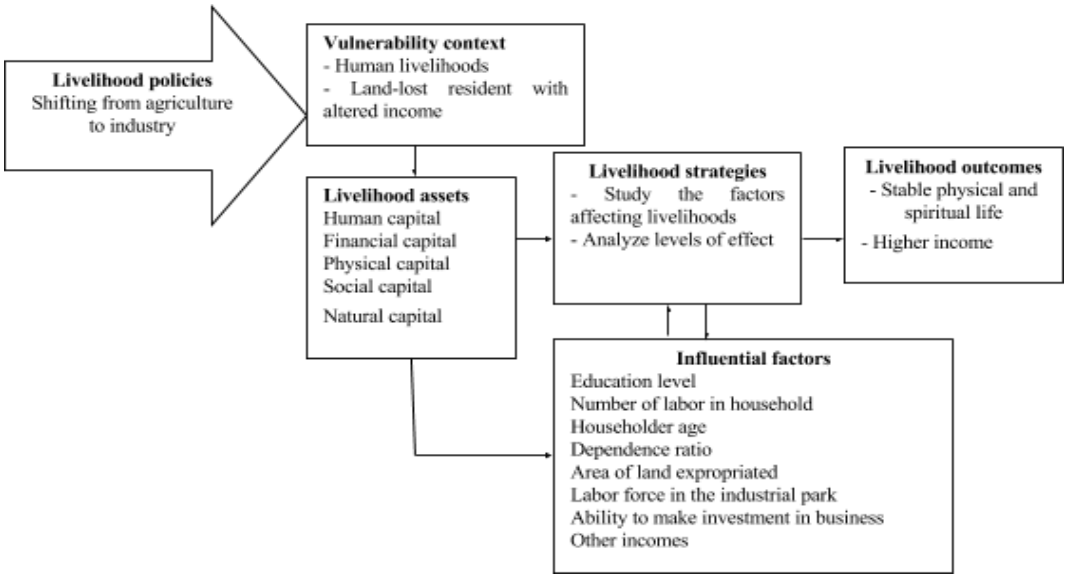

Figure 1. Analytical Framework of Sustainable Livelihoods

Source: Sustainable Livelihoods Framework (DFID, 2003)

Sustainable livelihoods framework shows the interaction between livelihood groups, each of which contains factors directly or indirectly affecting the change of residents' lives. Based on livelihood assets, the research would come up with significant factors that explain the change in income of the residents after land expropriation while starting their new lives.

In the models, livelihood policies mark a shift in the economic structure from agriculture to industry when industrialization and urbanization impact on land-expropriated residents as a vulnerable group. From the perspective of local government, the study finds that elements of livelihood assets include education level, number of labor in household, householder age, dependency ratio, area of land expropriated, labor force in the industrial park, ability to make investments and other incomes. These elements result in a sustainable livelihood with higher incomes and stable lives.

In a recent study, Đinh (2011) employs the framework to clarify the change in personal income after the expropriation of land for industrial park.

3. DESCRIPTIVE STATISTICAL ANALYSIS AND COMPARISON OF FACTORS INFLUENCING THE CHANGE IN INCOME

a. Sample Description:

The study is based on a survey of 109 households, accounting for 15 % of the total recorded with land expropriation and compensation. These were randomly selected from several hamlets of the same size and population density to fill in questionnaires and engage in face-to-face interviews. The selected sample comes with accuracy and reliability, allowing the generalization and represents all the households in the surveyed area aimed at by the research.

b. Descriptive Statistics and Comparisons:

Income level of 2005 is adjusted to 2012 price level to compare with real income per capita of 2012; and results of the descriptive statistic analysis and comparison of factors affecting changes in income are empirically tested.

- Changes in real average income per household

To compare certain changes in income before and after land expropriation, the research employs the average inflation index during the 2005 - 2012 period for a conversion of the income of 2005 into that of 2012 (at research time). Results show that the real rate of income increase is 45.9 %, and the real reduction rate is 6.1% (Table 2). An adjustment of income to the inflation rate reflects the change in real personal income.

Table 1: Average Income Among Land-Expropriated Household Groups (VND million)

	Comparison	**After expropriation**	**Before expropriation**	**Household group**
%	+/-			
				Before adjustment to inflation
188.4	27.106	41.494	14.388	Increased or unchanged income
80.2	13.572	30.492	16.920	Reduced income
				After adjustment to inflation
45.9	13.055	41.439	28.439	Increased or unchanged income
- 6.1	-1.985	30.492	32.477	Reduced income

Source: Authors' calculations (2012)

- Changes in real household income

Household groups with increased, unchanged and reduced income account for 44%, 12%, and 44% respectively (Table 2), which suggests a difficult life still widely recorded after land expropriation.

Table 2: Changes in Household Income at Surveyed Site

As %	**Number of household**	**Assessment Status**
44	48	Increased
12	13	Unchanged
44	48	Reduced
100	109	Total

Source: Authors' calculations (2012)

- Tests of factors statistically affecting income

To test whether the factors in sustainable livelihoods framework provided meaningful explanations for the change in income, table of statistics and chi-square distributions are employed. The results show that there are four factors statistically significant in explaining the change in income including: (1) decision to make investment; (2) area of land expropriated; (3) education level of householder; and (4) dependency ratio.

- Decision to make investment

Table 3: Decision on Investment and Changes in Income (households)

Total	Reduced income	Increased/Unchanged income	
65	18	47	Investment
44	30	14	No investment
109	48	61	Total
		$(Chi)^2_{critical\ value}$ =3.841	$(Chi)^2_{calculated\ value}$ = 17.4

Source: Authors' calculations (2012)

The dummy variable represents the effect of decisions on investment or no investment from compensation payments on household income [1]. Explanations for increased income in an economic sense include: (1) Investment would bring the profits or surplus from business, thus contributing to increased income; and (2) Investment would create job opportunities for members of a household, resulting in an income increase. However, types and levels of investment would not be investigated in this study.

- Education level of householder and change in income

Table 4: Education Level of Householder and Change in Income (households)

Total	**Reduced income**	**Increased/Unchanged income**	
10	7	3	Primary (up to grade 5)
59	27	32	Junior secondary (up to grade 9)
40	14	26	Senior secondary (up to grade 12)
109	48	61	Total
		$(Chi)^2_{\text{critical value}}$ =5.991	$(Chi)^2_{\text{calculated value}}$ = 6.98

Source: Authors' calculations (2012)

Statistical evidence shows that a high education level of householder would increase income for: (1) A higher level ensures the ability to absorb new knowledge and adapt a new life, allowing the householder to create jobs for himself and his family members; (2) Householders with good education would find it easy to work in the formal sector or to have more than one job for a high and stable income; and (3) Householders with high education levels tend to support improvements in education for family members, thereby increasing the household income although it might be difficult for the effect to be measured.

- Dependency ratio and change in income

Table 5: Dependency Ratio and Change in Income (households)

Total	**Reduced income**	**Increased/Unchanged income**	
25	3	22	0-20%
28	6	22	20-40%
41	25	16	40-60%
15	14	1	60-100%
109	48	61	Total
		$(Chi)^2_{critical\ value}$ =7.814	$(Chi)^2_{calculated\ value}$ = 35.7

Source: Authors' calculations (2012)

Dependency ratio reduces the household income since dependent members cannot generate income and live off other household members. When the income is divided, the household would end up with little or no savings, thus being unlikely to invest for an income change.

- Area of land expropriated and change in income

Table 6: Area of Land Expropriated (hectare) and Changes in Income (household)

Total	**Reduced income**	**Increased/Unchanged income**	
66	39	27	Small (0.019-1)
28	3	25	Average (1-5)
5	2	3	Large (5-7)

15	4	6	Extra large (7-14.7)
109	48	61	Total
		$(Chi)^2_{critical\ value}$ =7.814	$(Chi)^2_{calculated\ value}$ = 17.3762

Source: Authors' calculations (2012)

Area of land expropriated would increase income as the more land is expropriated, the more compensation is received, which could be turned into profitable investments. Yet, should the area and compensation amount be too large, the income will be reduced for: (1) The trend is that compensation would be spent on consumer's goods rather than investment; and (2) Lack of ability to manage a large sum of money or experience in cash management may lead to falls in income.

4. BINARY LOGIT REGRESSION MODEL AND POLICY IMPLICATIONS

To explain the increase or reduction in income of land-expropriated households, two values are given to the dependent variable of income: Y = 1 (increased and unchanged income) and Y = 0 (reduced income), and the binary Logit model is applied to measure the probability of the increase or reduction.

Table 7: Expected Effects of Factors on Changes in Income

Evaluation	Expected sign	Unit	Definition	Symbol	Variable
			Value 1 (increased/unchanged income) Value 0 (reduced income)	Y	Dependent
Education increases income.	+	Year	Number of years of schooling of householder	Edu	Education

Being in working age increases income.	+	Year	Age of householder	Age head	Householder Age
Being in working age increases income.	+	Year	Age of householder	SqrAgehead	Square Age
High dependence ratio reduces income.	–	%	Ratio of number of members not in working age to the total family members	Depend	Dependency Ratio
Large area of land expropriated reduces income.	–	(1,000)m^2	Area of land which is expropriated	Area	Area of land expropriated
Large area of land expropriated reduces income.	–	(1,000)m^2	Square area of land which is expropriated	SqrArea	Square area of land expropriated
Large number helps increase income.	+	People	Number of labor	Labor	Labor
Investment produces profits that increase income.	+		A dummy variable: if compensation is used for investment, Invest = 1; and 0 otherwise	Invest	Investment

Other income as a supplement to main income.	+	VND million	Amount received from other individuals/ organizations or another job	Other Income	Other income
Labor in industrial park receives stable income that improves and/or increases in household income.	+		A dummy variable;, IndusLabour = 1 (with labor in industrial park) and IndusLabour = 0 otherwise	IndusLabor	Labor in industrial park

Source: Based on sustainable livelihoods framework (DFID, 2003)

Based on Table 7, the regression function is as follows:

$LnO_0=\beta_0+\beta_1 Invest+\beta_2 Area+\beta_3 SprArea+\beta_4 Edu+\beta_5 Dependr+\beta_6 Agehead+\beta_7 SqrAgehead+\beta_8 Labor+\beta_9 IndusLabor+\beta_{10} OtherIncome+\varepsilon$

The binary logit regression results provide the following implication: if coefficients of the variables bear positive signs, an increase of one unit in this factor will enhance the probability of increase in the household's income and vice versa, holding other factors constant.

As shown in Table 8, the Wald test produces Sig. < 0.05. Among the ten variables, five are statistically significant, including: Investment (Invest); area of land expropriated (Area); square area (SqrArea); education (Edu), and the dependency ratio (Depend).

Table 8: Results of Estimates with Binary Logit Regression Model

						Assumed Model	Full Model	
Exp()	Sig.	Wald-Test	Coefficient	Exp()	Sig.	Wald-Test	Coefficient	Variable
0.113	0.184	1.763	-2.184	0.681	0.938	0.006	-0.384	Constant (C)

4.317	0.009	6.785	1.463	5.221	0.012	6.295	1.653	Investment capability (Invest)
2.222	0.019	5.466	0.798	2.467	0.023	5.165	0.903	Area of land expropriated (Area)
0.944	0.025	5.034	-0.058	0.927	0.017	5.688	-0.076	Square area (SqrArea)
1.555	0.002	9.426	0.442	1.567	0.012	6.339	0.449	Education level (Edu)
0.922	0.000	19.458	-0.081	0.930	0.000	13.385	-0.072	Dependency ratio (Depend)
				1.533	0.179	1.804	0.427	Labor generating income (Labor)
				1.028	0.968	0.002	0.028	Labor in industrial park (IndusLabor)
				1.469	0.120	2.415	0.385	Other income (Other Income)
				1.001	0.393	0.728	0.001	Square householder age (SqrAgehead)
				0.867	0.358	0.844	-0.143	Householder age (Age head)
		Sig.	$(Chi)^2$			Sig.	$(Chi)^2$	Omnibus test
		0.000	66.078			0.000	70.949	

Source: Authors' calculations based on gathered data

- Tests for insignificant variables

The research will test whether a specific variable should be eliminated using the critical values of $(Chi)^2$ in the two models before and after simultaneous elimination of explanatory variables.

Hypothesis H_0: $\beta_6 = \beta_7 = \beta_8 = \beta_9 = \beta_{10} = 0$

Hypothesis H_1: *with at least* β_6 *or* β_7 *or* β_8 *or* β_9 *or* β_{10} *different from 0*

Since $(Chi)^2_{calculated} > (Chi)^2_{critical}$ (4.871 < 11.070), H_0 is not rejected. Insignificant variables are left out and regression model shown in the right column of Table 8 is applied.

- Determination of precision of the model

The precision of prediction is shown in the following table:

Table 9: Estimates of Precision Level of the Prediction

		Prediction (Y)	Y (increased income = 1, reduced income = 0)
Percentage of precision	1	0	
81,2	9	39	0
86,9	53	8	1
84,4			

Source: Processed data

Table 9 shows that among 47 cases where the income is expected to reduce (by column), the prediction proves 39 cases with high precision, accounting for 81.2 %, and 9 out of 62 cases of increased and/or unchanged income come with wrong prediction, resulting in precise prediction level at 86.9% of the category and 84.4% of the whole model.

Table 10: Estimation of Income Improvement Probability

		Income improvement probability estimated according to 1-unit change in independent variable and different initial probabilities (%)	**Marginal Effect Exp ()**	**Dependent variable**
30%	20%	10%		Independent Variable
39.9	27.9	14.7	1.555	Education level (Edu)
28.3	18.7	9.3	0.922	Dependency ratio (Depend)
48.7	35.7	19.8	2.222	Area of land (Area)
64.9	51.9	32.4	4.317	Investment (Invest)
28.8	19.0	9.4	0.944	Square area (SqrArea)

Source: Authors' calculations

Table 10 suggests the probability of income changes under the marginal impact of each factor and the assumption of the initial probability being 10%, 20%, and 30%. Regarding the factor of education, the initial probability of income increase is assumed to be 10%, all other factors held constant; one more year of schooling causes the probability of income increase to reach 14.7%. Similarly, should the initial probability be 20% and 30%, the probability of income increase is 27.9% and 39.9% respectively.

Similarly, holding other factors constant, if dependency ratio increases by 1%, the probability of income increase is merely 9.3%, 18.7%, and 28.3%, reducing by 0.7, 1.3, and 1.7 percentage points compared to the original 10%, 20%, and 30% respectively.

Considering area of land expropriated, if the area comes with additional 1,000 square meters with the initial probability being 10%, 20%, and 30%, the income improvement probability will be 19.8%, 35.7 %, and 48.7% respectively. The diagram below could be used to account for the impact of slowdown caused by this parabolic law.

Concerning the effect of investment from compensation, when other factors are unchanged and the compensation is turned into investment in business, the probability of income improvement is 32.4%, an increase of 22.4 percentage points compared to the initial probability of 10%.

Accordingly, as implied by the survey and the results of binary logit regression model there exist four elements which provide meaningful explanations for the regression model. The degree of influence of the factors are sorted in order of importance after the impacts have been standardized, including investment, area of land expropriated, education level and dependency ratio.

Binary logit regression function is defined as follows:

$LnO_0 = -2{,}184 + 0{,}442Edu - 0{,}081Depend + 0{,}798Area + 1{,}463Invest - 0{,}058SqrArea + \varepsilon_2$

Graphical method could be used for explanation.

Table 11: Estimation of Probability of Impact

Upper	Lower	Ratio	P	Z	SE Coef	Coef	Predictor
			0.184	-1.330	1.645	-2.184	Constant
2.060	1.170	1.560	0.002	3.070	0.144	0.442	Edu
0.960	0.890	0.920	0.000	-4.410	0.018	-0.081	Depend
4.340	1.140	2.220	0.019	2.340	0.342	0.798	Area
12.980	1.440	4.320	0.009	2.600	0.562	1.463	Invest
0.990	0.900	0.940	0.025	-2.240	0.026	-0.058	SqrArea

Source: Authors' Calculations (2012)

The low collinearity between dependency ratio and other variables reduces the probability of income increase, that is, marginal impact becomes less volatile as once various variables are eliminated from the models (Table 11). Education as a variable increases the probability of increased income; area of land has a parabolic relationship with probability of increased income. When the area increases, the probability of increased income tends to increase, but only to the maximum of 82.7 square meters or it reduces the probability of increased income. The decisive variable with the strongest impact is investment made from compensation, but it comes with strong variability (1.440; 12.980), and all of these depend on the type of investment and the investment scale, which is not a focus in the study.

Table 12: Change in Probability of Marginal Effect

Decision on investment with compensation	1,000 sq. meters added to area of land	1% added to dependency ratio	One year added to years of education of householder	Decision on investment with compensation	1,000 sq. meters added to area of land	Change in probability compared to initial probability	Change in probability due to marginal effects	P_0
						1% added to dependency ratio	One year added to years of education of householder	
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.0
0.224	0.093	-0.007	0.047	0.324	0.193	0.093	0.147	0.1
0.319	0.148	-0.013	0.080	0.519	0.348	0.187	0.280	0.2
0.349	0.176	-0.017	0.100	0.649	0.476	0.283	0.400	0.3
0.342	0.183	-0.019	0.109	0.742	0.583	0.381	0.509	0.4
0.312	0.175	-0.020	0.109	0.812	0.675	0.480	0.609	0.5
0.266	0.155	-0.020	0.100	0.866	0.755	0.580	0.700	0.6
0.210	0.126	-0.017	0.084	0.910	0.826	0.683	0.784	0.7

0.145	0.089	-0.013	0.062	0.945	0.889	0.787	0.862	0.8
0.075	0.047	-0.008	0.033	0.975	0.947	0.892	0.933	0.9

Source: Authors' Calculations (2012)

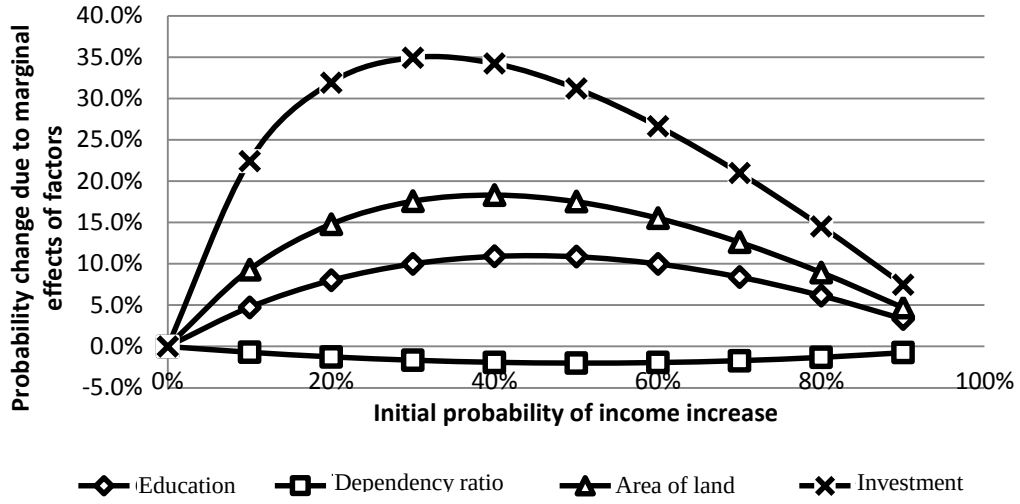

Figure 2. Probability Changes Due To Marginal Effects of Factors from Original Probability

Source: Authors' calculations (2012)

If the compensation is used for reinvestment, the probability of income increase will be higher and most powerful (Figure 2). However, the highest rate of probability increase from the initial one is 30%, followed by marginal effect of area of land (1,000 sq. meters). If the area is larger than 1,000 sq. meters, it will tend to increase the probability of income increase, which, on the other hand, increases with a decreasing speed as the initial probability is high. One additional year of education of the householder increases the probability, and high dependence ratio lowers the probability (as shown by the section below in the horizontal axis).

5. CONCLUSIONS

a. Main Contribution from the Research:

Several conclusions are drawn from the research: (1) Decisions on investment increase the household income; (2) a large area of land expropriated also increases the

income but a too large area reduces it as the households involved in land expropriation are purely farmers who have little experience in fund management, and they tend to spend compensation on luxurious consumer's goods; (3) a higher education level of householder contributes to increased income; and (4) an increases in dependency ratio reduces the income. These factors are statistically significant and consistent with the explanations of income change provided by the binary logit regression model.

b. Policy Implications

Based on research findings and study of policy in local government and people's opinions on economic perspectives, as well as on the importance of the afore mentioned factors, the research discusses and proposes short- and long-term policies, hoping that these would help local policy makers and enforcers in stabilizing life and increasing income of households after their transition to a new habitat. The suggested implications are as follows:

- Decisions on investment from compensation rationally explain the change in income, so the policy implications may be: (I) Capital of low cost are to be offered to households with efficient business plans and should not be distributed evenly without discrimination, and (ii) support programs could well be devised for each specific group, focusing on those with the ability to self improve income and alleviate the poverty; the basic support amount is not to be equally provided for all households as too small amounts would not help their businesses. A choice between efficiency of provided capital and poverty eradication policies is also to be made.

- Regarding the area of land expropriated, local governments should be responsible for adjustment of the compensation based on market price and instructions on business plans. Huge compensations from large areas of expropriated land results in a tendency among farmers toward consumer goods rather than investment because they have no, or very little, knowledge and experience of fund management.

- The impact of educational level of the householder is also important in direct and indirect income increase. Local governments are recommended to cooperate with education and vocational centers to give classes in general knowledge and vocational training that helps raise people's awareness, support new life adaptation, thus enhancing economic opportunities.

- Dependency ratio exerts its effect that reduces not only the average income of household, but the duration of work and/or economic opportunities■

Note

[1] $(Chi)^2$ Test shows whether results of these observations among factors with explanatory significance are correct as expected in regression illustrated in calculation as follows:

$$(Chi)^2 \text{ calculation} = \sum_{\text{value}} \frac{(\text{Observed value} - \text{Expected value})}{\text{Expected value}}$$

The value $(Chi)^2_{\text{critical value}}$ with degree of freedom: (number of rows-1)x(number of columns -1) with a significance level of 0.05

If $(Chi)^2_{\text{calculation}} > Chi)^2_{\text{critical}}$, the table has an explanatory significance and vice versa.

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