

THE IMPACT OF AGRICULTURAL LAND USE TRANSITION ON INCOME OF HOUSEHOLDS IN VIET TRI'S PERI-URBAN AREAS, VIETNAM

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Abstract

Since the late 1980s, Vietnam has experienced rapid industrialization and urbanization, which led to the acquisition of a large number of farmland in peri-urban areas for non-agricultural purposes. Farmland loss is indeed a burning topic that attracts attention from administrators, policy maker and the media. This paper investigates the relation between the agricultural land loss and income of households. Our research provides an econometric analysis of the impact of agricultural land due to urbanization and industrialization on household incomes in Viet Tri's peri-urban areas, Vietnam. The econometric results revealed that farmland acquisition was not statistically correlated with the incomes of the household in this study. It found no econometric evidence for negative impacts of farmland acquisition on incomes of households on the study site. Nevertheless, farmland acquisition should not be systematically considered as a negative trend as it can motivate the households to transform livelihood strategies towards non-agricultural work.

1. Introduction

In the process of industrialization and urbanization, the State has compulsorily acquired a very large number of farmland from the peasants for building industrial zones, urban areas, infrastructure projects, other national and public use purposes. The State acquired 697,417 hectares of land for use purposes as above mentioned (Martinez & Le Toan, 2007). At national level, around 500,000 hectares of agricultural land were acquired for construction of industrial zones, infrastructure projects and urban expansion that has influenced around 630,000 agricultural households in the period of 2000-2007 (de Wit, 2013). Around 11,000 hectares of agricultural land have been converted for industrial development and urban expansion in Hanoi's peri-urban areas in the city's land use plan. This plan resulted in about 150,000 people losing their agricultural work (Van Suu, 2009). In addition, Hanoi city's urban expansion on both banks of the Red river results in relocation of around 12,000 households. This expansion removes approximately 6,700 farms in Hanoi (Van Suu, 2009). A conversion of nearly one million hectares of farmland, accounting for around 10 percent of the total Vietnam's farmland for non-agricultural purposes was estimated over period from 2001-2010 (WB, 2011). It is estimated that, in Hanoi, Hung Yen and Vinh Phuc provinces, more than half the farmland has been

converted by 2011 for non-agricultural purposes such as the development of industrial zones, urban zones and infrastructures (Doan, 2011).

The government's agricultural land acquisition has an important impact on the lives of farm households in Vietnam's sub-urban areas. Land acquisition affected approximately 630,000 households and 2.5 million people in Vietnam (Lam-Dao, Pham-Bach, Nguyen-Thanh, Pham-Thi, & Hoang-Phi, 2011). (Nguyen, McGrath, & Pamela, 2006) gathered secondary data from various published documents and concluded that Vietnam had a rapid process of industrialization and urbanization in sub-urban areas. This process caused a large number of farmland losing households. Many households among land-losing households had fallen into poverty. A large scale survey in 8 provinces with the greatest agricultural land acquisition showed a rather pessimistic picture of farm household income. In this survey, around 18% rural households lost their farm income with nearly a 2.8% and 2.7% employment increase in industrial and services sector.

In many studies of this major economic and social transformation they found mixed impacts of agricultural land loss on household incomes, (T. H. T. Nguyen, 2011), (T. Tran & Lim, 2011), (H. K. L. Nguyen, 2013), (Huu, Phuc, & van Westen, 2014), (H. Tran, Tran, & Kervyn, 2015), (Nguyen Quang, 2015) and (T. H. T. Nguyen, Tran, Bui, Man, & de Vries Walter, 2016). Many factors can be brought forward. Farm land loss influences household incomes by creating new non-agricultural employment opportunities. It also changes livelihood asset of households. Many land losing households benefited from their proximity to industrial zones, urban centres. Many households built and rented out boarding houses to migrant people such as workers, students and income from this activity are their important income source. In many cases, compensation money of land loss was recognized as an important financial capital that helps farm households face shocks and ensure in profitable non-agricultural work (Phuc, Van Westen, & Zoomers, 2014). However, unfortunately not all peasants succeeded in creating suitable and sustainable livelihoods, many of them became unemployed because they did not receive appropriate education and vocational skills. As a result, there were differentiations in social aspects rising among farm households (Van Suu, 2009). In another way, the agricultural land loss has caused by the loss of natural capital of rural households, traditional farming skills, food supply and farm income resources. Their adaptation to the new situation is the diversity of their livelihood choices and strategies. They utilize the livelihood resources such as residential land, compensation money, human capital and other livelihood assets. The main income resource of households comes from wage employment that is usually higher but more unstable and unsustainable than farm income one.

In this challenging context, the main objective of this paper is to bring a scientific contribution and element of answers to this research question: how, and to what extent, has recent agricultural land loss impacted household income and its components, with a special focus on Viet Tri's sub-urban areas, Pho Tho province, Vietnam. We carried out this local study because although there have been a lot of study cases assessing the impacts

of farm land acquisition on agricultural income and its sources, but there is no study carried out by econometric way in the Viet Tri city, Phu Tho province, Vietnam. This is also a particularly burning topic that needs to be investigated as it is relevant administrator, policy maker and local people in Phu Tho province.

2. Study area

This study was carried out in Viet Tri, the capital city of Phu Tho Province. This city is a medium-sized city located in the North-East region of Vietnam, about 80 km from Hanoi. Viet Tri is situated in a very prime location that surrounded by a number of important roads, namely Hanoi – Lao Cai Highway and National Way 2. The city occupies 11,152.75 hectares of land, of which agricultural land accounts for 5,448.17 hectares. There are 23 administrative units in the city, including 13 wards and 10 communes. The city has around 51,563 households with 198,002 people. Farm labor occupies 20.49 per cent of the whole labor of the city. The corresponding figures for industrial and services one are 43.20 per cent and 36.31 per cent respectively (Statistics Department of Viet Tri city, 2016). The city has great potential for industrial development, agriculture, trade and services. Viet Tri is one of the first industrial cities of northern Vietnam. Viet Tri is also the economic centre of the province and contains many enterprises in industrial and service sectors. The city has developed some industries such as chemical, paper, apparel... The city has focused on the city's factories, enterprises, companies with industrial scale production. The industrial sector has contributed a large amount of provincial funding and jobs for many workers every year. At 2016, Viet Tri GDP per capita reached 74.92million VND per year.

Over the past few years, the socioeconomic structure of the Viet Tri city has experienced important changes, with a growing number of farmland acquisition projects. It has been lasting a massive conversion of agricultural land for non-agricultural purposes. In only two years from 2014-2016, the city lost 269.97 hectares of agricultural land for industrial and urban expansion projects. This farmland loss is about 5,2 per cent the whole agricultural land of the city. At present, several new urban plans have been or will be constructed in sub-urban areas. This creates the increasing pressure on farmland acquisition. Land acquisition in Viet Tri is characterized by the compulsory agricultural land acquisition.

3. Data and methods

3.1. Data collection

A household questionnaire was developed for this study. This questionnaire is adapted from the questionnaire of the 2016 Rural, Agricultural and Fishery Census in Vietnam. The questionnaire was designed to collect quantitative data on farm household characteristics, household assets and incomes. A sample size of 100 farm households, including 50 with land loss and 50 without land loss collected from 3 communes that are Phuong Lau, Trung Vuong and Thuy Van. The sample was randomly selected for research purposes. Nevertheless, 120 households were chosen, including 20 households for the

reserve, to reach the target sample size of 100 households. The survey was implemented in March 2017. Face to face interviews with one member of the households in the presence of another household member at least. In total, 100 households were successfully interviewed with 50 for the land loss household group and 50 for those without land loss. Among the former (households with land loss), some lost little of their land; some lost part of their land and others lost most or all of their land. Their agricultural land was compulsorily acquired by local government for a number of projects related to non-agricultural use purposes.

3.2. Analytical models

As mentioned above, the farm household sample was split into groups, namely land-losing households and non-land-losing households. For investigating the differences of the characteristics, assets and incomes of two household groups, we used the approach of comparing the mean of variables referred to characteristics, assets and incomes of household. We have many statistical methods for analyzing the differences in two mean values, which are based on analysis of variance (Kao & Green, 2008). In this study, we had two household groups with small sample size and no normal distribution, so we have to use the Mann–Whitney test for quantitative variables and Chi-squared test.

The Mann–Whitney test is also called the Mann–Whitney–Wilcoxon test which is a non-parametric alternative to the independent sample T-test. Because there is a similar nonparametric test used on dependent samples that is the Wilcoxon signed-rank test. The Mann–Whitney U test used to test whether two sample means are equal or not. It is used when the assumptions of the T-test are not met or when the data is ordinal. Unlike the T-test this test does not require the assumption of normal distributions. It is nearly as efficient as the t-test on normal distributions (Ruxton, 2006).

Total annual household income, total in this study is continuously distributed over positive values. Ordinary least squares regression (OLS) was usually used to analyze factors influencing total annual household income. However, other components of total annual household income are total annual farm income and total annual non-farm income, which are continuous but censored at zero. The ordinary least squares regression estimator will give biased results in this case. So we had to use Tobit regression for such data. Tobit regression analyzes the determinants of total annual farm income, total annual non-farm income and total annual household income in this study (Otsuka & Place, 2001). Household characteristic and assets were assumed to determine total annual household income and its components.

The definition and measurements of variables included in the analytical models are presented in Table 1.

Table 1. Definition and measurement of variables in analytical model

	Definition	Measurement
<i>Independent variables</i>		
Total income	Total annual income from farm, nonfarm and other	1,000 VND
Nonfarm income	Total annual income from wage and self-employment in nonfarm activities	1,000 VND
Farm income	Total annual income from planting and livestock production and other related activities	1,000 VND
<i>Explanatory variables</i>		
Land loss	The proportion of farmland that was compulsorily acquired	Ratio
Land-losing	Whether or not the household farmland is acquired	Land-losing=1; Non-land losing=2
<i>Household characteristics</i>		
Age of household head	Age of household head	Years
Gender of household head	Whether or not the household head is male.	Male=1; Female=2
Education of household head	The highest level of education of the household head attained in the last 12 months age members	Primary=1; Lower Secondary= 2; Upper Secondary=3
Farmlabor	The number of household laborers in farming work	Person
Nonfarm labor	The number of household laborers in non-farming work	Person
<i>Household assets</i>		
Farmland size	The size of owned farmland per household	m2
Residential land size	The size of residential land owned by households	m2
Value of household assets	Total value of household assets	1,000 VND
Financial capital	Economic resource measured in terms of money used by household to generate household livelihood	1,000 VND
Past nonfarm participation	Whether or not the household had participated in nonfarm activities before farmland acquisition.	=1 if yes; =2 if no
Commune variables	The commune in which the household resided	Phuong Lau = 1; TrungVuong = 2; Thuy Van = 3

4. Results and discussions

4.1. Background on household assets and income sources

Some information on household characteristics, assets and past participation in nonfarm activities for two land-losing and non-land-losing farm household groups is presented in the table 2. There were statistically significant differences in the number of farm labour and non-farm labour, the farmland size and the farm income between two groups. On average, the land-losing group had more farm labor than the non-land-losing group. This was a worrisome fact. This would increase the pressure for and changing work from the agricultural sector to non-farm sector. Therefore, land-losing group still remained more farmland than non-land-losing one. This suggests that the city's administration could choose areas that had many agricultural lands in order to acquire for urban development projects and other projects using land for non-agricultural purposes. This also suggests that local administration could make an effort to limit maximum socioeconomic instabilities for land-losing households. They still hold a large number of farmland comparing to the common average per household of the locality. This could help farm household to avoid shocks and sudden change in their livelihood. Because they had more farmland, although were acquired, so it is easy to understand why land-losing group still had higher farm income than non-land-losing group. Nevertheless, this has not meant because the total annual household income of two groups proven was equivalent.

This helps judge that livelihood changing of land-losing household group was not good and compensation level for farm land acquisition in Phu Tho province is too low. That was not enough to make a difference in value of productive assets in farm production and service sector activities. This was confirmed by comparing the value of assets between two groups that was not statistically significant difference. Similar as farm land, land-losing group also had more residential land than non-land-losing. This is explained by the politic intent of management levels in the locality.

Research results also indicated that there were no statistic differences on some characteristics of two household group such as gender of household head, age of household head, education level of household labors, the participation in non-farm activities before land-acquired. This showed that human capital, social capital of the two household groups was similar. Physical capital presented through the assets of the two groups also did have no statistically significant difference. In modern society today, human capital is considered as the most important capital, financial capital is the second, and then social capital and so on. So, though land-losing group has more natural capital, but this was enough to make a better livelihood outcome as total annual income of this household group was not higher than non land-losing household group. Because non land-losing household group had less land resources so they balanced their income themselves by non-farm income. This showed a dynamic ability of whole two groups in access to jobs in the non-agricultural sector. Because there was no difference in more early access to non-agricultural activities,

in general, experience and working skills in the nonfarm sector of two groups judged were similar. So they did not make the difference in income in non-agricultural activities.

Table 2. Statistics of household of household characteristics, assets and incomes

Variables	All households		Land-losing households		Non-land-losing Households		Mann-Whitney / Chi spare test
	Mean	SD	Mean	SD	Mean	SD	Z/ χ^2 a
<i>Household characteristics/assets</i>							
Gender of household head	1.23	0.42	1.20	0.40	1.26	0.44	0.58
Age of household head	47.66	9.45	49.14	9.25	46.18	9.51	-1.69
Education level of household head	2.51	0.56	2.58	0.53	2.44	0.57	1.58
Farm labor	1.76	0.57	1.98	0.14	1,54	0.73	-3.99***
Non-farm labor	1,65	0,97	1.44	0.97	1.86	0.92	-2.05**
Past non-farm participation	1.36	0.48	1,40	0.46	1.32	0.47	0.69
Farmland size of household	1097.73	771.91	1354,48	913.60	840,98	484,40	-3.08***
Residential land	356.70	205.52	409.04	205.96	304.36	193.21	-8.60***
Value of Household assets	53057	9796	54950	11853	51164	6789	-1.44
Financial capital	12997	14807	9390	5176	16594	19734	-0.59
<i>Household incomes</i>							
Total household income	145296	56628	144012	62646	146581	50508	-067
Farm income	10932	6017	12252	7320	9613	4002	-3.33***
Non-farm income	145296	56628	131760	61713	136968	50796	-0.10

Notes:^aapplied to dummy variables. *, **, *** mean statistically significant at 10%, 5% and 1%, respectively.

The determinants of household income components are presented in the table 3. There are some explanatory variables with high statistical significance. But these results are not similar to the results of (Nguyen, 2014). Land loss had no effect on farm income. The fact indicates that the agricultural land loss had made farm household change the structure in agricultural production toward having a more efficient farm income. That can compensate the increase of farm income coming from the resulting farm land loss. The loss of agricultural land had also no effect on non-farm income. That can explain that the farm land-losing household members could change their livelihood choices and strategies, although the compensation money from farm land loss is low. It is indeed not sufficient to make a great change in their livelihood. This study provides a new finding on household income components comparable to the previous research on the same topic as (T. H. T. Nguyen, 2011), (T. Tran & Lim, 2011), (Tuyen & Van Huong, 2014), (Tuyen, 2014). This is possibly attributed to the features of the study site of this research that is a sub-urban area of a small city in a transition zone between the delta and the mountain; East and West of the northern mountain zone of Vietnam. The previous studies were almost carried out in

the big cities or the dynamic-economic cities in the motive-economic zones of Vietnam as Hanoi, Ho Chi Minh city, Hung Yen city, Hue city... By this study, we complement the picture about the impacts of farmland acquisition on household income components in a small city in Vietnam.

The result of econometric analysis showed that households with more labour enjoyed increased non-farm income. But this factor has no impact on the farm income. These results are opposite to research results of (Van de Berg, Van Vijk, And Van Hoi, 2003) and (Jansen, Midmore, Binh and Tru, 1996) (Huang, We, and Rozelle, 2009) and (Tran, 2014). Our results reflect the situation of most of the households in the site study that have low-effective farm production. Many households hadn't had been strongly relying on farm activities before farmland loss. So when farm land acquisition happened, these households used the compensation money that comes from farmland loss investing in agricultural activities in order to increase agricultural production effectiveness with hope that this compensates the decrease of agricultural production due to farmland loss. But they were not successful with that livelihood strategy.

Table 3. Estimates for determinants of farm and non-farm incomes

Explanatory variable	Non-farm income	Farmincome
Land loss	41.13647 (107.6841)	32.10785 (28.88832)
Gender of household head	11023.47** (5201.076)	-2539.553* (1395.814)
Age of household head	-2347.864*** (250.6537)	128.4443** (64.11862)
Education of house household	-2478.889 (4078.512)	-19.99250 (1086.395)
Commune	787.6080 (2768.272)	-844.8851 (741.4901)
Financial capital	0.320143** (0.155052)	0.088134** (0.041939)
Household assets	-0.136554 (0.235051)	0.045907 (0.062787)
Household labour	56467.88*** (2467.047)	725.7174 (641.4875)
C	46148.16* (25286.20)	3017.544 (6804.471)

Notes: Standard errors in parentheses. *, **, *** mean statistically significant at 10%, 5%, and 1%, respectively

Female headed households have higher farm income than male headed households. But oppositely, male headed households earn more non-farm income than female headed ones. This can be explained by the fact that agricultural activities are more suitable for female gender while non-farm livelihood in research areas is more adapted to male labor. This result is similar with other previous work such as (T. H. T. Nguyen, 2011), (T. Tran & Lim, 2011), (Tuyen, 2013), (Tuyen& Van Huong, 2014).

The education level of household labor does not affect household incomes for both farm income and non-farm income. This indicates that household livelihood in research areas was based on farm and non-farm activities that do not require much knowledge or specialized skills. That reflects the fact that farmland loss lead to change in livelihood strategy of household in Viet Tri's sub-urban areas, but the livelihood choices of households were not complicated activities in both farm sector and non-farm sector. Education level were found to play an important role in changing livelihood choices in other researches - but particularly those carried out in areas where it is possible to find jobs requiring professional knowledge and higher skills.

This study reveals that household assets do not play an important role in generating income in both agricultural and non-agricultural activities. That is explained by the low level of investment in households' productive assets in the study site. This is not in line with the research results of (Nguyen, Kant, Mac Laren, 2014). Therefore, the financial capital of households affects both farm and non-farm livelihood in research areas. It suggests that if compensation money from farm land loss was used to invest in both farm and non-farm activities that could generate both additional farm and non-farm incomes for households. That is coherent with other studies on this topic as (Van Suu, 2009, (T. H. T. Nguyen, 2011), (Tuyen& Van Huong, 2014), (H. Tran et al., 2015).In addition, the location of household has no impact on both farm income and non-farm income in this study. This can be attributed to the fact that the households in study site do not live in concentrated-popular areas with many universities and company or large urban.

The econometric analysis shows that there is no impact of farmland loss on total household income. This is explained by the balance in the different impacts of farmland loss on both farm and non-farm income sources. The households were well adapted to the new situation that was created from the state land acquisition. Although there were no effects of farmland loss on household livelihood in the short term, a positive impact on long-term income can possibly be expected when the amount of compensation money from land loss invested in the development youth human resources will bring effectiveness in the future, especially the amount of investment in education for children of households. This suggestion is also well supported by the studies of (Nguyen, 2013), (Nguyen, 2014). Age of household head is a factor that has effects on the total household income. This is can be explained by the fact that younger working members had better ability for adapting to the shock of land acquisition. That is similar to the analytical results of farm income and non-farm income.

There was no effect of households' educational level on their total income, in Viet Tri's sub-urban areas. This analysis result is coherent with those for farm and non-farm incomes mentioned above. The location of households also does not impact total household income. The value of household asset also has not affected on the total income of households similarly with both farm and non-farm income. Therefore, financial capital had an impact on the total household income as its concerns both farm and non-farm incomes. The analysis also showed an important effect of number of worker in household on their total annual income. This finding is similar in the other research in various localities in Vietnam as (Van Suu, 2009), (T. Tran & Lim, 2011), (T. H. T. Nguyen, 2011), (H. K. L. Nguyen, 2013), (Tuyen & Van Huong, 2014).

Table 4. Estimates for determinants of total household income

Variable	Coefficient	Std. Error
Land loss	77.31051	107.6369
Gender of household head	6603.640	5200.752
Age of household head	-1973.115***	238.9037
Educational level of household	-1998.547	4047.868
Commune	193.7560	2762.766
Household assets	-0.100173	0.233944
Financial capital	0.388489**	0.156263
Household labour	55148.38***	2390.159
C	46804.09*	25353.21

Notes: *, **, *** mean statistically significant at 10%, 5%, and 1%, respectively

Conclusion

This study investigated the relationship between farmland loss and income generation of households, to complement scientific analysis of previous surveys using qualitative and quantitative methods with descriptive statistics analysis. We carried out an econometric analysis in order to explain the impact of land loss on total household income and its components. The results of our research reveal that there were no statistically significant impact of land acquisition on household incomes as well as its resources as farm income and non-farm income in Viet Tri city's sub-urban areas. The first explanation is that households of research site are well adapted to the new situation created by farmland acquisition. Residents seem adapt to balance the effects of farmland loss and compensate with additional incomes, resulting in no change on their incomes. Nevertheless, a policy implication can be proposed here: Facilitating to access capital

resources (rural credit, small loans etc) for land-losing households so that they can diversify livelihood choices and strategies. Young people in land-losing households need to be supported in finding jobs so that they can generate higher and more stable income sources. Specially, Administration of communes should be interested in creating new livelihood for land-losing households with many labours so that they have opportunities to increase their income from their available resources.

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