

**Land Privatization and Its Impacts on Rural Livelihoods: An Examination from the Southern Uplands of Vietnam**

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## Land Privatization and its impact on rural livelihoods: An Examination from the Southern Uplands of Vietnam

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### Abstract

This paper examines the process of implementing land privatization and its effects on household income in the southern uplands of Vietnam. The research was undertaken in three upland villages situated in the buffer zone of Cat Tien National Park in the southern uplands of Vietnam where have recently been adopted a land privatization program according to the 1993 Land Law and some other frontier development programs, such as nature conservation, remotely mountainous community development programs supported by the central government. Such policies and programs have ultimately aimed at improving both upland livelihoods and environmental sustainability of the uplands, simultaneously.

The research ha unequivocally demonstrates that though the land privatization throughout the nationwide has been guided by the unique legal framework, its implementation in the uplands, particularly in the buffer zone communities of Cat Tien National Park has resulted in the notable divergence across communities, even households. The differences in the result of implementing land privatization in the upland communities were mainly caused by different factors related to both land legislation and local practices. Unsurprisingly, the divergence of implementing land privatization among communities and households has actually created differentiation in distributing benefits of land privatization among communities and households. Our empirical findings have suggested that land privatization (land allocation and land titling) has played a significant role in enhancing land tenure security which provided better opportunities to farmers' access to formal credit with low interest, on the one hand and encouraged farmers to undertake more investment into their production which facilitated to household income growth. Furthermore, our empirical findings have also demonstrated that household resource endowments, access to markets and extension have also posed important position in household income generation. However, it should be noted that a role of land title and household initial productive resources, access to markets and extension have affected different sectoral investments and incomes, differently. Finally, the empirical findings have suggested that nature conservation has indirectly impacted household livelihoods by hampering the implementation of land privatization which resulted in excluding those without land title from access to formal credit, attenuating farmers' investment incentives and income.

**Keywords:** southern uplands, buffer zone, Cat Tien National Park, property rights, land privatisation, tenure security, formal credit, investment, livelihoods, indigenous ethnic minorities, Kinh, Tay, and Ma.

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### 1. Introduction

Since the mid-1980s, Vietnam has progressively moved towards a market – oriented economy. Land reform has been one of the most important policies in the reform package. In fact, land privatization was initiated since 1981, but the “radical land privatization” has only come since the 1993 Land Law was passed by the Vietnamese National Assembly. This Land Law provided a legal framework for allocating land for long –term and stable use and granting five rights of land use – the rights of transfer, exchange, lease, inheritance, and mortgage to land users. At the same time, the Law also gave security of tenure over allocated land for 20 years for land used for annual crops and aquaculture, and for 50 years for land used for perennial crops and forestry purposes. The allocation would be renewed at the end of allocated term if land users would still need to continue

using the land. Accompanying with the land allocation, land tenure certificates<sup>1</sup> were issued to the individuals and farm households. The further revisions to the 1993 Land Law have resulted in land users being assigned some additional rights to release land use rights as joint - venture capital for investment and to gift their land to relatives and friends. The real estate markets including markets of land use rights has been officially recognized. Furthermore, the most recent revision in 2004 of the Land Law also set out the circumstances for allowing land related changes and procedures for registration of changes.

The land privatization has been widely recognized to have contributed to production increase and development in agricultural and rural sectors. Thus, the 1993 Land Law and its further revisions intended to provide farmers security of land tenure by allocating land for stable long-term use and awarding land title. There is a certain amount of consensus among economists that better property rights to improve economic outcomes (Quy and Iyer, 2005). They suggest both supply and demand impacts of secure land rights (defined as private property rights or owning a registered deed): first, greater security of ownership to the farmer or the landowner increase demand for land improvement; second, security of ownership increases the supply of credit through provision of tradable collateral. Both result in greater long-term investment in productive and land conserving technology as well as short-term investment in inputs leading to higher sustainable production. Hence, greater land tenure security of tenure leads to higher productivity through increased incentives for investment on the part of land owner (Feder and Noronha, 1987). However, such mentioned relationships have been inconclusive or spurious in many cases. The recent literature on this field shows that land privatization might not facilitate land tenure security, better credit access, land transfers as well as increasing investment which are due to different reasons. In addition, the empirical studies seem to not pay sufficient concern about the linkage between land privatization and income diversification in the rural areas. Therefore, on the one hand, this empirical work aims at adding more empirical evidences to the existing tenure literature and on the other hand, based on its empirical findings some policy implications for further land reforms in particularly and rural development in general would be drawn.

## **2. Theoretical background**

The study adopted combination of property rights institutions and livelihood approaches as its analytical framework. Property rights to land and other natural resources are considered as “a bundle of rights” and associated duties that ensure rights holders to claim benefit stream from natural resources under the protection of some authority system (Bruce and Fortmann, 1989; Bromley, 1991; Bruce, 1998; Maxwell and Wiebe, 1998). Property rights in general and property rights to natural resources in particular affect powerfully economic performance and economic development by influencing the incentives of actors to create new wealth or dissipate (Libecap,

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<sup>1</sup> From now on, I refer the land tenure certificate (LTC) as the land title

1989). In narrow sense, in any rural or agrarian economy, access to and rights in land and natural resources are central to an analysis of livelihood strategies and livelihood security societies (Doward, 2001b).

Recently, development research in most transitional economies has been oriented towards intensively focusing on links between land privatization, land institution change and rural livelihoods. There are rich empirical studies show that most importantly land privatization via land titling has enhanced the well-defined and secure private property rights (Sanjak and Cornhiel, 1998) and changes in property size (Cleary and Eaton, 1996). Deiniger and Feder (1998) further investigate that well-defined and secure private property rights to land as precondition that would increase the incentives for long-term investments in production, improve transferability of land to cultivators who have resources to make better use of it, or to facilitate land transfers, stimulate the land market and increase the supply of land on markets, to be a mechanism for redistributing land and making land more accessible to landless and land poor farmers, and induce the ability to use land as collateral to increase access to medium and long term formal credit markets for undertaking investments. Many other studies also arrive at the same conclusion. As a result, the land privatization strongly leads to grow agricultural production, productivity and income (Awood, 1990; Sanjak and Cornhiel 1998; Deininger and Feder, 1998; Maxwell and Wiebe, 1998; Feder and Nishio, 1998, and Barrow and Roth, 1990).

However, the aforementioned benefits of land privatization via land titling having on rural livelihoods remain still ambiguous and inconclusive in many cases. It is particularly true. Many empirical studies investigate that even though land titling has prominently reduced insecurity, it might not result in increased investment or higher agricultural productivity. Farmers with secure tenure might not invest for many reasons. It is argued that in addition to ownership security, farmers' investment decisions are affected by a number of factors, such as alternative investment opportunities, accessibility of production inputs, the farmer's present debt structure and overall profitability, of farming and availability of capital (Stanfield, 1985, Pagiola, 1999:4). In many cases, where land reform is attempted and land is allocated to the poor, they might face problems of a lack of capital and knowledge to develop it. They might lack experiences in farm management and find it difficult to market their crops (Cleary and Eaton, 1996). Moreover, land titles may not give farmers better in access to formal credit markets. Financial institutions have often been reluctant to offer credit to small farmers, on the one side (Stanfield, 1985; Cleary and Eaton, 1996), and many farmers are reluctant to borrow against land even if credit are available, from fear of foreclosure and losing their land should adverse agricultural conditions prevent them from paying their loans because of lacking insurance markets, on the other side (Stanfield, 1985; Carter, 1993; Cleary and Eaton, 1996). Thus, land tenure is only one amongst many influences on agricultural production (Sikor et al, 2003). Productivity is more often due to access to technology and product markets (Sikor et al, 2003; Cleary and Eaton, 1996), physical infrastructure, effective credit systems, marketing institutions, and level of economic development (Feder and Nishio,

1999). The benefits of land titling therefore depend on the broader political economic context (Sikor et al, 2003).

In short, the tenure literature as discussed has shown that that the impacts of land privatization land titling on rural livelihoods have been inconclusive. Such literature has also called for our further attention in analyzing the impacts of land privatization by looking at more deeply other relevant factors which might at the same affect rural livelihoods. By reviewing the tenure literature, we have also found that the tenure literature has seemed to pay over attention on impacts of land privatization on farm income while other income components have not been adequately taken into account. We need therefore to address both issues mentioned in this empirical work.

### **3. The study setting**

#### **3.1 Selecting and describing the study villages**

Three villages with certain extent to similar and different characteristics were chosen with the purpose to draw up a picture of what livelihood strategies had been practiced by farmers and how land privatization had affected farmers' livelihoods. These villages situated in the buffer zone of Cat Tien National Park in the southern uplands of Vietnam with their ecological system representing roughly for that of southern uplands of Vietnam in which plain, medium and low hills were mixed. At the time of the study, Ma village had around 1494 people who divided into 322 households. The average household size was around 4.6 people. Though village population was small and lived in the homogenous area, ethnicity was far from being uniform. The village population belonged to seven different ethnic groups who had different histories to the village. Of them, the Ma and Stieng were two dominant groups who were classified as indigenous minorities and had a long history of settlement in the village. Meanwhile, population of Kinh and Tay Village was smaller than that of Ma village was. By 2004, the Kinh village had 887 people living in 161 households. The average number of people per household was 5.4. Tay village was a bit less populous than Kinh village was. It had around 764 people split into 149 households. The average size of household was around 5.1 people. In these two villages, ethnicity was rather homogenous.

In term of economy, like many remote villages in the southern uplands of Vietnam and the buffer zone of Cat Tien national park, these three villages were categorized as a poor group. A large number of households fallen into poor and poorest categories. Evidently, in the Ma village, there were 65.96% of total households considered as poor households. Tay village's economy was also not brighter. About 54.66% of Tay village's households belonged to the poor and poorest groups. Among three villages, the poor situation in the Kinh village was not as serious as of the first two villages, but a number of poor households still remained at high rate (37.5%). It is worth to note

that a large extent relying on agriculture and forest for making living was a common livelihood strategy among households. Statistically, eighty percent of their income earned from agriculture and forest products. On average, there were 6.2% of land households, 28.5% of households lacking capital, and 44.6% of households without permanent house.

### **3.2 Data collection and analysis**

The analysis in this study has been drawn on diverse sources of data including both secondary and primary data. A wide range of secondary data sources was documented in forms of published literature, official statistics, legal and policy documents, and monographic studies were selectively gathered. Primarily qualitative and quantitative data were mainly collected from interviews with 43 key informants and a survey of 121<sup>2</sup> sampled households. Moreover, primary data was supplemented by direct observations and informal discussions with various groups of actors.

The combining qualitative and quantitative approaches have intentionally employed in this study for data analysis. The descriptions and explanations on the process of land privatization, livelihood practices and trends as well as effects of land privatization on rural livelihoods have been basically developed on secondary and primary sources of qualitative and quantitative data in a manner in which qualitative and quantitative discussions have been applied simultaneously to assist each other whereby the biased trend and subjection in data analysis could be reduced and creditability of data analysis could be raised.

## **4. Effects of land privatization on the upland livelihoods**

### **4.1 The implementation of land allocation and titling**

Following the *Doi Moi* reform policies launched in 1986, the government of Vietnam has undertaken radical land reforms towards privatization of land use rights. Initially, the 1988 Land Law was issued to dismantle cooperatives and to distribute land and production decision making to individual households. In order to keep the process of economic reform, Vietnam's National

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<sup>2</sup> The household survey was conducted on 121 households. 41 households in Ma village, 39 households in Tay village, and 41 households in Kinh village were observed respectively. However, two observed households from Kinh village were omitted from the analysis because they represented extreme outliers in data set. One of these households earned 44.1 million VND from the other source income annually which is 10 times higher than the next highest in the sample. The other one was recorded as obtaining a loan with 100 million VND from formal credit source by using land title as collateral which is 3.3 times higher than the following largest amount in the sample. These two observations are very useful in appreciating variation that can occur in income generation and resource endowments of households. Unfortunately, their presence in the sample might distort the estimations and for these reason they were excluded.

Assembly passed a new land law in July 1993 (Sikor, 2005). This law aimed at finalizing in the changes in land use rights of farm households by substantially widening the bundles of rights to landholders in associated with land allocation and land titling. According to Sikor (2002) the land allocation and land titling program was expected to be finished within few years. However, land allocation had produced a diversity of outcome. It proceeded straightforward in some areas, but uneven in other areas, particularly in the uplands. This consequence was caused by the constellations of factors lying in both land legislation and local practices.

Thus, our empirical observation shows that land privatization in these three villages had been uneven and rather difficult process and mainly undertaken assignments of land title to farmer households. The empirical study indicates that the final step of land privatisation had remained uncompleted at the village and household levels, despite of having been started for a long while. Precisely, agricultural land privatization in Kinh and Tay village had initiated since 1997 and still been underway. Statistically, by the time of fieldwork, there were 127 HHs (78.88% %) with 125.09 hectares (88.03%) assigned land title in the Kinh village and 118 HHs (78.67%) with 153.84 hectares (80.97%) of total agricultural land granted land title in Tay village (**table 1**). The rest of households registered with the communal land allocation committee, but their application has not been yet qualified. In contrast, the land privatization in Ma village proved a rather uneven process. It had been taken place at slow pace. By the time of fieldwork only first several steps of land title issuance, such as establishment of cadastral mapping, the land allocation committee, and land registration had been carried out. The remaining steps to finalize LTC issuance had been underway. The empirical investigation persists that this unexpected result of implementing land privatization in these villages has been due to several hampering factors, such as, divergent results of implementing previous land policies, local conditions, lack of coordination between line agencies, the central government and local authorities, constraints of finance, technique, low-skilled land administrators, inflexibility and impracticability of land legislation, and high transaction costs incurring in the implementation of land allocation.

**Table 1: Agricultural land allocation and titling in three study villages**

	Total area	No. of HHs owned agr. land	Total agri. land (ha)	Agri. land with LTC		HHs with LCT	
				Area (ha)	Percent	Number	Percent
Ma Village	1100	314	305	0	0	0	0
Tay Village	250	150	190	153.84	80.97	118	78.67
Kinh Village	227	161	142	125.09	88.03	127	78.88

(Source: The compilation of secondary data collected 2004-2005)

In sum, the empirical examination on land privatization in the buffer zone villages in the southern uplands has well reflected that the enforcement of land privatization in the uplands has been a difficult process and resulted heterogeneously across villages, even individual households. More importantly, in many cases land privatization had merely ratified the informal rights to land that

already practiced by land users rather than readjusted landholding among land users as stipulated in the law. The land privatization thus legitimized the informal rights existed.

## **4.2 The impacts of land privatization on household income**

### **4.2.1 Patterns of household income**

Our empirical survey of 119 selected households in three villages figures out some basic characteristics of patterns of household income as summarized in **table 2**. Generally, the result of a household survey reveals that farmers had nowadays no longer relied on a single source of income but they had at the same pursued different income generating activities for their means of living. There are all seven income categories practiced by villagers<sup>3</sup>, including crops, livestock, fisheries, forestry, enterprises, wages, and transfers and other. However, the role of each income source contributing to household income was different one another. The role that farm, a traditional livelihood of local people, had played gradual changes parallel to the process of economic development, but farm economy was still considered as a principle basis of livelihood, in terms of contributing cash income and ensuring food security to villagers. Thus, virtually all of households (97%) in the study villages involved in crop production and farm income accounted for a half of household income (50%), on average. Contrasting to crop production, wages were though not a traditional livelihood of the villagers, they had become common recently. Wages were now not only thought as a coping strategy of the poor but also an accumulation strategy of better income households. Statistically, wages got involve 83% of households and generate 21% of household income. Wages were considered as the second important livelihood activity of the villagers. Livestock production was ranked the third important economic activity after crops and wages despite of having practiced for a long history. About 80% of households undertook livestock production which made up 12% of household income. As observed, livestock production had gradually shifted towards commercial purposes in spite of livestock raising being commonly adopted the extensive method. Forestry had also been a traditional livelihood of villagers, but its role had increasingly become minor in household economy. Currently, about 60% of households participated in forestry activities which generated approximately 9% of household income. Enterprises were a newly performed income strategy of villagers. Our survey data shows that about 15% of households in the sample made their income from enterprises which shared 5% of household income. Although enterprises were thin in terms of both number of household participation and contributed value, the presence of enterprises signaled a radical shift in economic behavior of villagers stepping towards market orientation. Apart from such

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<sup>3</sup> In current literature related to rural livelihoods, household income classification is taken in several ways which is depended on the targets of research. In this study we employ the income measure that has been recently applied to classify rural income in Vietnam suggested by General Statistics Office of Vietnam and International Donors. Household income is classified into 8 categories, that is, crops, livestock, fisheries, forestry, enterprises, wages, transfers, and others. However, I combine transfers and others into one category sine these two income categories are popular among villagers' income

mentioned income generating activities, inland fish raising and the rental of land had recently come being in livelihoods of villagers. Almost one-fourth of households (22%) had income from fisheries which occupied only 3% of household income. Inland fishing raising were principally for household consumption. Inland fish raising might not help villagers much in terms of cash income but was particularly important in improving household staple food need. Among income generating activities being practiced, “other sources” income posed the least important contribution to household income. Only 1.68% of households had income from other income sources. In a value term, the other income sources contributed purely 0.2% of household income.

**Table 2: Income distribution among rural households in 2004**

	Share of households earning (%)	Net income (million VND) <sup>4</sup>	Share of net income (%)
Crops	97	12.23	50
Livestock	80	2.87	12
Fisheries	22	0.73	3
Forestry	60	2.13	9
Enterprises	15	1.20	5
Wages	83	5.04	21
Transfers and others	1.68	0.05	0.2
Total	---	24.24	100

(Source: Household survey 2004-2005)

The income strategies practiced among villagers are well reflected the ways in which those living in the agriculture and forestry –based communities, particularly in the uplands of Vietnam earned their living. On the one hand, people had continued to maintain their principally basic livelihoods, such crop production, collecting non - timber forest products, subsistent fish and livestock raising, off –farm wages which were the ways to secure their livelihoods and to ensure the future of family’s socio-economic status. On the other hand, villagers had gradually shifted their resource endowments to make income from other economic sectors, such ad non-farm wages, enterprises, commercial livestock production and so on. By doing so, they might reduce difficulties that they had faced with their traditional livelihoods or increase their cash income.

#### **4.2.2 Effects of land privatization on household income**

This section aims at presenting empirical findings related to the impacts of land privatization on household income. Such findings stemmed from estimation results on simultaneous equations models specifying the relationships between land privatization, formal credit access, household resource endowments, investments and incomes. Three - stage least squares estimation procedure was used with helps of *Stata software version 8.2*. In addition, the single equation models with

<sup>4</sup> Note: at the time of fieldwork, 1US\$ was equal to 15,908 VND

assistance of linear least squares estimation method was applied to estimate linkages between land privatization and forestry, wage, other sourced incomes since information related to investment in these economic activities were not available. Such empirical findings were also supplemented by qualitative data which collected by interviews with key informants, focus groups, the head of households, and participation observations as well. This data was particularly helpful. On the one side, it assisted to make the interpretations relying on results of statistical estimations more transparently and convincingly. On the other hand, such data could help to reduce biased or unclear results generated by statistical estimations.

#### **4.2.2.1 Effect of land privatization on household aggregated income**

##### **(i) The land title, collateral, formal credit<sup>5</sup> access linkages**

The estimation results report that the land title is positive and significant at 1% level (table 4)<sup>6</sup>. These results provide some support to the idea that land tenure security<sup>7</sup> would enable farmers better opportunities to access to the formal credit, on the one hand, and also makes the formal creditors willing to lend out to those households with land title, on the other hand. Because, since the land title would provide collateralizable assets for the bank, the creditor would foreclose the collateral land in a case of default. Nevertheless, our own observation indicates that land title was only a factor to determine possibility that farmers could get a loan from the formal credit lenders while lending decision was belonged to the credit lenders. Thus, there is ample evidence that farmers faced the problem of being credit constrained and also encountered additional difficulties regarding borrowing procedure. Both of creditors and borrowers confirmed that each eligible farm household could get a maximum loan of 20 million VND within a term of 6 months or of one year. The farm borrowers would acquire a new loan if they would pay their given loan back

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<sup>5</sup> In context of Vietnam, formal rural credit is defined as the credit that provided by the Vietnamese Bank for Agriculture and Rural Development (VBARD) and access to such a form kind of credit referred to ability to obtain a loan. Principally, such a form of credit is lent out to those borrowers who have the land tenure certificates (LTCs) by which landholders are defined as eligible borrowers. The empirical finding shows that this rule is strictly followed. No surveyed households in Ma village can get a loan from the bank because they are not yet awarded the LTCs. For them no way other than accessing to informal credit provided by private lenders with a high interest. In contrast, approximately 76% of those households having the LTCs in Tay and Kinh village gain access to cheap credit supplied by VBARD. Each titled household can yearly get an amount of 7.66 million VND, on average. The largest and smallest amounts of credit are 30 million VND and 2 million VND, respectively.

<sup>6</sup> The positive effect of land title on households' formal credit access also means that the establishment of Cat Tien National Park has at the moment negative impact on those households of Ma village located adjacent to the Park, indirectly, because they are not assigned the land title due to the conservation regulation

<sup>7</sup> Land tenure security is equal to the awarded LTCs because from the state side, the LTC is the highest legal document that confirms its protection the rights of titled landholders. On the side of land holders, they also report that they feel their land rights comparatively more secure since their land is assigned the LTCs. 92% of households with the LTCs in the sample survey affirm strongly their land rights safer as compared to before awarding the LTCs.

to the bank. Very few farm households could get additional ration of loan out of loan limits as defined. Notice that a size of titled land of farm borrowers had not affected to an amount of a loan that they had obtained. In fact, the formal lenders discriminated against smaller farm borrowers, practically. Evidently, for those farm households possessing smaller 0.4 ha of agricultural land, they were strictly constrained in gaining access to the formal credit otherwise they would own a large size of value assets, such as a good house, tractors, harvest machine, grinders, cattle etc. Moreover, a fact should be care about farmers' borrowing behavior that 24% of titled households were not actual confident to use their land as a collateral for acquiring a official credit from the bank because they had feared their land that would be foreclosed if they would be not able to pay the given loan at the end of borrowing term<sup>8</sup>.

Besides the land title, possessions of relatively more endowed with wealth and more value assets<sup>9</sup> enabled farmers to access to the state credit though they could not substitute the land title. This is not a surprising fact. In a circumstance rural land markets were not active and well functioned. The state creditors often required the farm borrowers using their both the LTC and value assets as collateral when they applied for a loan. In a case that farmers would be insolvent, the state creditors would have higher possibility to reclaim their loans given to farmers by foreclosing and auctioning the given deposited land and assets. Statistically, the coefficient on wealth index is positive and significant at a 1% level in the credit equation (table 4). We can conclude that the household wealth together with land title positively influenced on farm households' access to the state credit.

The political position holding of the head or other members of the household was thought to play positively a role in households' access to the state credit. This hypothesis initiated by the idea that holding political positions would give farmers more opportunities due to their close ties to the creditors and their political power by which they would catch up to the state credit. In reality, this assumption was not happened. Apparently, the credit equation estimations point out that there

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<sup>8</sup> In "moral economic societies", for instance the rural society of Vietnam, where farmers rely on their small farm for making means of living, land is not only a source of livelihoods, but also social-economic identity. Losing land is simultaneously considered as losing a living means as well as social-economic identity. Therefore, some subsistence-oriented farmers are afraid of using land as collateral to gain access to credit. They would be foreclosed their land in a case of default due to production failures.

<sup>9</sup> Based on my observations and discussions with villagers and key informants at the village and communal level, the household wealth in the study villages was quite obviously reflected by household ownership of valuable economic assets, which included a good and brick house, motorbike(s), television (s), tractor(s), grinder(s), oil-pumps(s), and cattle. In order to rank the wealth among households, such expensively economic assets were then converted into the wealth index. The index measured from zero to one, representing the ownership of non to all of the listed assets. The wealth index was used in the study despite of holdings of value assets. Notice that land was a particularly economically value asset for those households in the study villages, but it was not included in the wealth index measure for two reasons. First, land was used to estimate directly its affection to households' credit access, investment, and incomes. Second, not all kinds of land that households owned were precious. For example, some area of upland field owned by households was not meaningful for either agricultural or forestry purposes.

was no clear signal of political holding influencing on households' access to such the state credit. The coefficient on political holding is positive and significant at the 18.9% level (table 4). This statistical findings are consistent with the empirical investigation discovered by interviews with villagers and creditors. All interviewees asserted political capital of the household had not improved the household access to the state credit. In fact, they also believed that for those households with the head or members participating in the political system might be well-informed information about this credit source.

### **(ii) Land title, credit access and aggregated investment**

One of the most striking observations is the relationship between land titling and investment motivation. Statistically, total household investment is correlated the land title though correlation is not actually strong ( $R^2 = 0.1799$  and significant 5%)<sup>10</sup>. The statistical estimations are compatible with the finding obtained from interviews with the head of sampled households and selected key informants. About 93% of households with land title in the sample reported they had felt their land rights more secure since their land awarded the land title by which their incentives to undertake investment into not only farm production but also other economic sectors had been well ameliorated. In addition, those households without the land title also asserted if their land would be assigned the land title, they would increase their investment in their production. The substantial incentives to carry out investment in production that households had enhanced can also be elucidated from another perspective. Decollectivization accompanied by land allocation and land titling had particularly induced the aspirations of farmers at least in economic sense that had been extremely jeopardized under the collectivization time. Thus, the incentives that households had been brought due to the land titling are quite simply understandable.

We continue our discussion of effects of land titling on the household's aggregated investment by looking at impact of formal credit access on the household's investment, one of focuses of our analysis. As explored in tenure literature, land titling might affect the household's investment indirectly by affecting household access to the formal credit. The estimation results on the impact of land collateral – accessed credit from the investment function in the simultaneous equations model show clearly that magnitude of formally acquired credit affects the aggregated investment of the household. The positive coefficient appears to support the reasoning that greater magnitude of the formal credit obtained signals greater aggregated investment to be undertaken. As the head of households reported that the more formal credit they gained the more investment they made. This is completely reasonable that a large number of households in the study villages and extent to other buffer zone and upland villages had extremely lacked financial capital accumulation therefore credit gained had become their major capital for carrying out productive investment. However, at a 99% confidence level, one unit of formal credit accessed increase explains only

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<sup>10</sup> A variable land title is omitted from the aggregated investment equation because it highly correlates with other variables in the equation.

13% of increase in the household's aggregated investment. This is understandable in the circumstance of the study villages. The survey informs that not all formal credit invested into short-term economic activities. Thus, over 55.56% of households announced using 20% to 50% of such achieved credit to buy production equipments, to invest into cattle husbandry, and other economic sectors<sup>11</sup>.

Besides formal credit, other forms of credit, mainly private sources, also posed a certain role on total household income. The estimation results indicate that amount of private credit that households got is significantly and positively related to the aggregated investment. Reasonably, private credit was a main external source of capital for production investment for those could not gain access to the formal credit and even for those households could access to the formal credit, but not sufficient. Our household survey suggests that over 80% of households without the land title had to get loans from private lenders. Each household could borrow 4.22 million VND, on average, and maximum 30 million VND and maximum 1million VND for a term of 3 months. In addition, over 38% of households with the land title had also gotten, at the same time, loans from the private credit sources. They used this credit for either investment when they had high demand credit but could not get additional loans from the state credit institutions or payment for their debt owing the state credit institutions when it was due but their returns from production was not enough to pay for such debt.

We now look at the effects of the household resource endowments on the aggregated investment. Discussions with villagers and local key informants indicated among others, landholding, education of the household head, labour force, wealth are the most influential resource endowments of the household to investment. We therefore include these kinds of factors into the estimations. Other forms of resource endowments such as political position and age of the head of households, average education of adult members are though omitted in that model, they are paid sufficiently concern in analysis.

The estimation results are quite reasonable, but not completely in line with expectations. All four variables related to agricultural land, that is, size of annual crop land, fishery land, industrial crop land are positively and significantly associated with the aggregated investment. Thus, this is virtually natural that the more land that households have the more investment they would undertake. However, this argument is not always accurate; it might be only correct at the sample level, but not right at the observation level. As observed, not all households in the sample had undertaken intensive investment. Evidently, many poor households in the sample, particularly those in Ma village had still relied on extensive agriculture due to their farming *habitus* and lack of productive resources. This means that farm size might not be tightly associated with investment. Contrasting to the farm size, the forest land size does not explain the aggregated

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<sup>11</sup> In this work, the aggregated investment and income are only calculated for a year therefore long-term investment such as cattle husbandry investment is omitted.

investment. There is no indication from our statistical results that prove three other kinds of household resource endowment including the household wealth, labour force, education of the head have significant effect on the aggregated investment. This finding is against the expectation that the household labour force and wealth would have negative effect on the aggregated investment. Such an expectation built on the assumption if one owns more labour and is wealthier his/her investment would be costly reduced due to lower hired labour and plough costs (**see table 4**). The above finding provides only a general picture of how the household resource endowments affect the aggregated investment.

Access to market and extension services is also important in explaining the household aggregated investment. First, access to input markets, here referring to places of purchasing inputs: either at village shops or otherwise, appears to hamper household aggregated investment. It was thought that although the strengthening of land rights due to land titling has an important role to play in encouraging investment, it is not likely to be effective without corresponding changes in the incentive structure posed by current prices for inputs. Our observations remark that higher prices of purchasing inputs at the villages caused inclining farmers' positive investment behavior. Second, access to extension services had increased household investment. It becomes clear that extension access is significantly and positively related to investment. It realizes that better technical knowledge that households accessed would induce them to increase demands for investment. What has been statistically found is in accord with household report. They had been encouraged to undertake investment since they were trained technical knowledge for production.

### **(iii) Land title, formal credit access, investment and income**

In the first two subsections, the analysis has been developed surrounding the relationships between land titling, the state credit access, and investment. Several important facts have been come up with. A question raised here whether land title, formal credit access, and investment were turned into income or not. Answers for this question will be posed in this subsection. Furthermore, precise analysis on the linking between resource endowments, market and extension accesses are also included. By doing so, understandings on roles of land titling and the household's endowments and resource accesses playing on household income are adequately established.

The land title has a relevant impact on the household's income. This is to be expected. Thus, the results of both directly estimating relationship between land title and the household's aggregated income we obtain that at the 1% level of significance land title is associated with household income, controlling for other factors (see table 4). The statistical finding consents with what recently explored in the tenure literature and property rights theory. Land privatization (including land titling) is likely to have significant effect on income of those land reform beneficiaries by its affection on improving land tenure security, formal credit access, investment incentives. In order

to arrive at a firm conclusion, an alternative examination was made by indirectly estimating the linkage between the aggregate investment and total income of the households. The estimation results confirm the aggregated investment is significantly (at a 1% level) and positively related to household total income. It becomes clear that land privatization signals on household income improvement by affecting land tenure security, credit access, investment incentives. Moreover, this empirical investigation has not only verified the positive role of land titling having on household income but also reflected ability of farmers to capture benefits from their own investment.

The resource endowments of households are also important in explaining the household's total income. Their role in income generation manifests more obviously as compared to that in the aggregated investment though not all categories of resource endowments signal explicitly their impact on the household total income. Concretely, the estimations report results for variables referring to agricultural land including annual crop and industrial crop land have positive and significant effect on the household total income (see table 4). Unsurprisingly, agricultural land is a principle basic resource by which households in the sample and extent to those in the uplands, particularly the poor areas generated income. As found from a household survey, in 2004, 97% of households participated in farm production and calculated crop income contributed dominantly in the total income of the household (50%).

A variable relating to fishery land gives mixed results. Instead of having positive effect on the total investment, the estimation results show fishery land has no effect on the household's total income. The results are contradicting to expectations, however, are well fitted with the real situation. Inland fishery was a new form of livelihoods that recently had appeared in the study area. Its income contributed only 3% to the household total income (see table 1). In addition, virtually all households in the sample involving in inland fish raising announced their fish raising was extensive with low costs of investment and mainly for their own consumption rather than commercial purposes therefore they were regardless its economic sense. Even though those raised inland fishes for commercial purpose were also less concerned its returns. This can, in fact, help explaining why fishery land did not affect the total income.

With respect to forest land, the estimation results point out forest land holding influencing neither the total investment nor household total income. No evidence indicated from surveyed applying any kinds of input into their planted forest, except allocated their own labour sometimes to take care their plantation forest. This is quite reasonable to interpret why relationship between forest land and investment could not be disclosed. As for unclear linkage between forest land and the total income, it can also be argued that much of planted forest owned by households has not yet reached its productive capacity therefore the harvest value was very low, accounted for 3% of the total income.

Of four other variables referring to resource endowments of household, that is, labour, wealth, education and position of the household head, only labour, wealth, and education are significantly and positively related to household total income (see table 4). The estimation results are quite applicable and in line with expectations. Labour endowment is not only a resource of productive process, such as agricultural production, but also directly generated income, such as wages. In a case of the study villages, farm and wages were two important sources of income therefore those who had more plentiful labour would earn higher income. Household wealth referring ownership of value assets was also an essential endowment by which farm households made their income. Hence, wealthier households would make higher income. Education of the household head was one of household value human resources. The better education one would have better working skills, better knowledge in management and decisions on him/her production and economic activities that would enable him/her to earn income, directly or indirectly. The statistical estimations are completely in accord with what found from observations that those households got higher income also owned rich in labour, wealthier, and well-educated head. Political involvement of the household head or other family members is positively but not significantly related to the total income. These results are totally encountered expectations. As a matter of fact, it is well aligned with the reality. Earnings that the political position holders got from their position were as small as compared to their household total income. Though political position of the household head does not have clear impact on the total income, it is possible to have effects income from wages (discussion in details in next section).

Finally, the estimations show interesting results on variables relating extension and market access. The parameter estimates for extension access from the model are statistically significant and positive to the total income. The positive influence of extension access to the total income can be understood through two directions. The former is associated with extension access and increase of investment demand. The latter is explained in a way that access to extension would improve farmers' productive technical knowledge. As a result, such accessed knowledge would translate into income through improving production more effectively and sufficiently. These two explanatory assumptions are also in line with what found by interviews those households having access to extension services. Another explanatory variable relating to market access vector which expected to negatively affect household income is places of selling products. However, the estimates indicate its negative coefficient, but not significant for the total income. The estimation results are also different from the way that villagers asserted on the impact of product selling places. As they expressed, if products are sold to local shops, money lenders, entrepreneurs, or sold at the farm gate, the selling prices would be lower as compared to the prices of selling the products that sold in communal center market.

#### **4.2.2.2 Effects of land privatization on household sectoral incomes**

##### **(i) Effects of land privatization on the crop income**

Income from crops had currently played its overwhelming role in the household income (accounted for 50% of total income). At the time of fieldwork, several most common crop grew by villagers were rice, maize, cassava, legumes, fruit trees, cashew nut, coffee and pepper. Of which rice, maize, cassava had been traditional crops while the remaining crop were recently cultivated by villagers. In a scope of this work, we will examine the effects of land privatization on the income generated from crop production at the aggregated level.

The simultaneous equations model was applied to estimate the above relationships with support of three – stage least squares estimation procedure. The estimation results report not all expected explanatory variables having significant effects on the crop income, but give a fair fit. We begin our discussion of the results by looking at the impact of land title, one of the most concerns of our analysis. It has become clear that the positive coefficient for formal credit appears to support the reasoning that larger amount of formal credit that households gained, more investment into crop production that households undertook. This helps explaining the land title indirectly improved the household's investment into crop production by affecting the household's access to formal credit. To this end, the findings also enrich the empirical studies on relationships between land titling, formal credit access, and investment. Notice that a variable representing private credit accessed is not significantly associated with crop investment. As a matter of fact, the private credit was an important source of capital for those could not gain access to formal credit, but it was limited in terms of magnitude due to fear of risk on the side of private lenders therefore a role of private credit gained is not clearly reflected in crop production investment (see table 5).

Apart from formal credit access, household resource endowments, access to markets and extension services also significantly determined crop production investment. Holdings of industrial crop and annual crop land are both significantly and positively related to crop investment. This fact is evident truth, but it also reflects the trend in livelihood strategies of local people. As once I raised somewhere, industrial crops were not traditional agriculture for villagers. The positive relationship between industrial crop land and crop investment implies that villagers tended increasingly to shift their investment into high – value crops. In contrasting to land holding, other household endowments, such as labour and wealth, considered as other two important endowments, are not significantly associated with the crop production investment. Their role playing on the crop investment is thus questionable. This might be explained either households had not used their labour and value assets effectively with respect to the crop investment or they had reallocated their large share of labour and value assets into other economic sectors. Interestingly enough, places of purchasing inputs is significantly, but negatively while extension access is significantly and positively, facilitated to crop production

investment. Compatibly, purchasing inputs at village shops with high prices might reduce household's crop investment while access to technical knowledge was probably to give rise the household's investment demands. It can be extrapolated to conclude that the access to market and extension has directly affected the household's crop investment.

In order to arrive at a conclusion whether or not land title and the household's initial endowments have determined the household crop income, we look more closely at the estimation results from the crop income equation (see table 5). Controlling for other factors, the estimates suggest that the crop investment is significantly (at a 1% level) and positively relevant to the crop income. Systematically, a precise conclusion could be drawn here that the land title had raised household income from crop production by successively affecting formal credit access, then investment and finally income. At the same time, the estimates also assert other factors including places of purchasing inputs and size of agricultural land had have certain influences the crop income, indirectly. Especially, extension access had direct and indirect effects on the crop income. This is again interpreted that extension access, on the one hand, induce the household's crop investment demands and on the other hand, it could be transferred indirectly into the income through knowledge and skill enhanced.

The results we obtained further confirm a role of other factors playing directly on the crop income. Firstly, a size of agricultural land appears to affect significantly and positively the crop income. In other words, besides the crop production investment, agricultural land that a household possessed directly determined income that the household earned from crop production. A larger farm would be expected to generate a greater income from crops. Secondly, the household wealth did not impact on the crop income, but was translated directly into the crop income. Since a household owned more value production equipments, it would extract more income from the crops. Roughly, this finding would lead to the conclusion that the initial endowments of households played a decisive role in making income. Thirdly, political position that member(s) of households is significantly, but negatively associated with the crop income. Presumably, those households with member(s) holding political position might not devote all endowments into crop production or might have less other necessary endowments for the crop production. Fourthly, household labour does have a relevant impact on neither crop investment (see the previous discussion) nor crop income. This is to be not expected because labour is one of the most important resources for economic activities, particularly for farming that those in the study villages endowed. Yet, the results are acceptable. In order to compensate for cash constraints, households relied on more intensive inputs instead of labour intensity and then reallocated part of their labour for other economic sectors which could bring them a cash income immediately, such as wages. This explanation is quite well fitted with the current situation of the study villages and also against a conventional thinking that shifting labour into off and non-farm sectors caused by tenure insecurity. Fifthly, education of the household head did not have significant return from the crop income (see table 5). It is not an unusual consequence because

the education of the household head might not always help households to earn more income from crop production, but might improve other income components (see following discussions in this section).

With respect to relationships between accesses to markets, extension, subsidies and crop income, only access to markets (represented by variable related to places of selling products) explains the crop income. Thus, the estimates show a variable related to places of selling products is significantly (at a 10% level) and negatively associated with the crop income. The result is becoming to my investigation from discussions with villagers. The negative effect that places of selling products had on the income from crop production was facilitated with selling prices of products. If products were sold at farm gate or to money lenders or middlemen, the farmers often got lose of returns due to lower prices as compared with prices that sold the same products in the communal center markets. The estimates further detect that access to extension services is not directly absorbed into the crop income, but indirectly by affecting an increase of crop investment. Completely contradicting to accesses markets and extensions services, receiving input subsidies from rural development and buffer zone development projects<sup>12</sup> did not help households to improve their income from crop production although such subsidized inputs were to directly target farm and livestock production. Unsurprisingly, as reported by villagers, such subsidies were very disproportional in terms of their value.

### **(ii) Effects of land privatization on the livestock income**

Livestock production was the third important income source which brought to households 12% of total income, but the second important cash income after wage income, yearly. Traditionally, livestock was raised for purely for household own consumption purpose. Raising livestock for a commercial purpose had been recently triggered by penetration of markets into the villages. Main species of livestock included pig and poultry<sup>13</sup> in which pig raising was though less popular, its contribution to livestock income was overwhelmed in comparing to that of poultry.

The estimates from the livestock income model (see table 6) reveal important results. The results are virtually met our expectations. The most concerned factor, land title, that appears to have a relevant impact on income from livestock production by simultaneously affecting formal credit access, livestock investment. Gaining access to formal credit increased income received from livestock production. This finding yields a new insight into relationships between land title and

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<sup>12</sup>Rural development projects are those projects that undertaken by the local governments and funded by the central or provincial governments while buffer zone development projects are also funded by the central government and international donors, but undertaken by the authority of Cat Tien National Park

<sup>13</sup> Cattle are excluded from the above list. Although cattle husbandry for commercial purposes has recently emerged and also contributes importantly household income in terms of net value, but cattle transactions are infrequent.

an increase of income lying beyond farm production which seemed to have been missed in the tenure literature.

The household endowments, particularly labour force and landholding are also important in explaining the income gained from livestock production. First, households with less labour endowments devoted more investment into livestock production. This was rationalized by hypothesizing that the nature of livestock production in the small scale required less labour. Furthermore, as its nature, households with livestock production could make use their members' leisure or child labour in feeding their pig or poultry. Therefore, those with less manpower tended to increase more livestock investment is quite logical. Notice that the endowment of labour only affected income from livestock production, indirectly by influencing livestock investment. Second, the household's land holding has, as found, significant, but negative effect on the household's livestock income (see table 6). These results do not encounter both what explored in literature and the real circumstance of the study villages. Inevitably, those who possessing less land had to make up their insufficient income from farming by seeking income from other sources in which livestock production was a possible source in rural areas.

Access to extension services also played a decisive role to household's decision to undertake investment of livestock production. This appears to support the reasoning that better access to extension would lead households to increase livestock investment. This assumption is in line with contents of extension services that targeted to train villagers' technical knowledge on livestock production and farming. As stated by extension officers, transferring technical knowledge related to crop and livestock production is the most prioritized goal of the government's extension programs. In opposite, access to markets (referring places of purchasing animal food) had no impact on livestock investment (see table 6). This is not a challenge to put forth a plausible interpretation. Based on the local situation, in a very traditional way of feeding pig and poultry, farmers usually tried to make use by-products from their daily activities and crop production at best, to feed their animals instead of relying on animal food served by markets. In subsistent economies, such economic behavior would help farmers to cope with risks that they might have in a case of losing their investment due to animal death, diseases, and market failures, though returns from such a way of keeping animal are low as compared to intensive methods. With regarding a role of input subsidies playing on livestock income, the estimation results confirm no effect of this factor having on livestock income could be found (see table 6). Although such kinds of subsidies delivered to farmers in the region targeted to principally promote improving farmers' income from crop and livestock production, the provided subsidies were too insufficient in terms of magnitude to sway substantially changing income from the livestock production.

### **(iii) Effects of land privatization on the fishery income**

Fish raising has recently come existent in strategies of villagers. Inland fish raising contributed a small share to household total income (3%) and mainly for household consumption purposes. The estimation results from the simultaneous equations model show that the key point, the impact of land title and formal credit access on fishery investment and income was not happened. The results further suggest that though investment into fish raising is negatively and significantly associated with places of purchasing inputs and positively and significantly affected by holding of fish pond and amount of private credit accessed, the income from fisheries is only determined by the holding of fish pond (see table 7). Combining these statistical facts and our discussions with villagers, several conclusions could be come out. Firstly, fish raising was a sideline livelihood strategy which played a minor role in households income therefore those raising fishes do not devote their resource endowments and formal credit accessed to this economic activity. Secondly, no relationship between fishery investment and income occurred. This helps us to explain the previous assumption. Finally, as observed, raising fish in the study villages was very much relied on the extensive feeding method by using by-products of daily human activities and farming, except breeding fishes therefore the returns from investment might be not sufficient.

### **(iv) Effects of land privatization on the forestry income**

Forestry income in this defined as net value earned from selling NTFPs collected from natural forests, such as bamboo and bamboo shoot<sup>14</sup> and forest products harvested from plantation forests including mainly paper milk timber. Income from forestry activities was though thin (9% of household total income), it is particularly meaningful to villagers, especially to the poor and ethnic minority farmers, in sense of helping them to cope with the period of slack during which they were hungry or lack of serious cash for purchasing necessary daily items and production inputs.

The single equation model with linear least squares regression method was employed to estimate the effect of land title on forestry income instead of using the simultaneous equations model with assistance of the three – stage least squares estimation procedure. Because the available information related to forestry income suggests that no direct relationships between land title, formal credit access, and forestry investment were occurred. As reported by villagers, they did not undertake any investment into their plantation, except some labour to take care their forest.

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<sup>14</sup> Several types of NTFPs such as firewood, wild fishes, and wild animals are very important for household's own consumption, particularly for those indigenous ethnic people in Ma village. However, calculating income from such products is not easy because they are small in terms of amount and infrequent so the error of income measurement from that economic activities is relatively high. Therefore, we decide to omit their value in forestry income calculation.

We therefore decided to employ the single equation model in which land title directly included as an explanatory variable.

Based on the estimation results from the mentioned model, several findings are apparently raised up. First, as expected, land title has a significant and negative coefficient for forestry income. If we rely only on the estimation results, it can be extrapolated that the land title is considered as a driving force to reduce the household's income from forestry. However, this assumption is not correctly reflected the local situation because forestry income simultaneously consisted of both incomes from selling NTFPs and timber harvested from titled plantation forest. Looking closely at forestry income distribution among villages, the highest income from forestry activities as well as the largest number of forestry involved households was found in Ma village. At the same time they were also those who had not been awarded the land title. This helps to explaining why the land title had negative impact on the income from forestry. Second, as also expected, forest land holding is associated with a significantly higher income from forestry. Thus, presently several plantation forest holders in the sample could extract some income, instead of not much, from their forestry. Thirdly, education of the household head has a negative and significant effect on forestry income. This finding is very meaningful in sense of policy implications. We have discovered that those who with less education, particular indigenous people, seemingly had less alternative opportunities to earn income from other economic activities which required relatively well-trained skills. They therefore had to be heavily contingent on forest resources to making their living. This is especially true for ethnic minorities and poor farmers, for example a large number of ethnic minority and poor farmers, also less educated ones, engaged in illegal collection of NTFPs from the Park. Fourthly, selling forest products at villages to either consumers or private entrepreneurs have a positive and significant influence on forestry income. Interestingly, the estimation results on variable referring to places of selling products is negatively and either significantly or insignificantly associated with household total income and several other sectoral incomes while appears in an opposite direction in a case of forestry income. However, the results are feasible because all forest products harvested were sold at the village and no distinctive differentiation between product prices at village or center markets could be observed.

Three other factors, such as labour, wealth, extension access, included in the model do not significantly explain forestry income. Firstly, as mentioned early, labour endowment was the most important capital for households to gain income from both NTFPs collection and plantation forest, theoretically. However, despite of being expected, household labour resource shows insignificant effect on forestry income. Practically, these results are completely logical that on the one hand, as empirically observed, households often used child labour, leisure of main labour, or elder members for collecting NTFPs while main labour were moved into to other economic activities which might bring them higher cash income. On the other hand, it is probably that collecting NTFPs was not necessarily associated with household labour endowment, but rather than it was depended on household economic background. Secondly, household wealth does not

help improving forestry income (indicated by insignificant effect in the estimation results). Not susceptible, household value assets, as defined, were not useful in either collecting NTFPs. Finally, access to extension services is not significantly related to forestry income. The results are not against the local circumstance because extension services had not transferred any knowledge or services regarding to forestry production (see table 8).

#### **(v) Effects of land privatization on the enterprise income**

The most common non-farm enterprises were found among villagers in the sample were handcraft, food processing, and retail trading. The enterprises were not a traditional form of livelihoods of villagers, but they had been come to exist for more than 10 years and also had increasingly become popular and an important economic activity. In 2004, income from enterprises shared 5% of a total income of the household, on average. Such a form of income was expected to occupy a crucial position in livelihood strategy of villagers in the future due macro economic reforms, economic growth, rising local goods demands etc.

The simultaneous equations model were set up to estimate the impacts of land title on income from enterprises with assistance of three - stage least squares regression method (see table 9). The estimation results from the simultaneous equations model figure out very few of explanatory variables are good at predicting the income from enterprises. The investment into small enterprises was significantly (at a 1% level) and positively related to the amount of private credit accessed, but negatively associated to the household's total landholding. The income derived from small enterprises is significantly and positively facilitated to enterprises investment, land holding, and extension access. These estimated results are though a bit contradictory, but quite logical (see table 9). Using the facts detected by interviews with villagers, on the one hand, at a moment times in order to raise cash income, some of those who had less land, even they belonged to upper land middle income groups, intended to reallocate part of resource endowments (e.g. private credit accessed) into small enterprises. On the other hand, they continued keep their farm production ahead. This livelihood strategy was commonly found among upper and middle income households. This caused why their total land was negatively related to their enterprises investment, but positively associated to their total land. Combining the facts regarding positive effect of enterprise investment and extension access having on enterprise income, we can interpret that well-trained knowledge accessed from extension services had played a significant role in enhancing farmers' skills in doing enterprises.

The key variable in this model is the land title. The estimated results we obtained do not meet our expectations, but is perfectly suitable to the local situation. The household's investment into the enterprise sector and then the household's income earned from enterprise were not determined by the credit gained by land title collateral, but were affected by credit accessed from private sources. As reported by villagers and formal credit lenders, the land title holders were

accepted to get loans from the bank through land collateral only if they approved the gained loans would be invested in the agricultural sector such as using loans obtained to purchase farm inputs and farm machinery, to invest in cattle husbandry and livestock raising etc. while using such loans for other economic sectors were not acceptable. Consequently, formal credit had impacts neither on enterprise investment nor income from enterprises.

#### **(vi) Effects of land privatization on the wage income**

Income from wages was the second important income source in term of cash contribution. As calculated, the wage income contributed 21% of the total income of the household, on average. The most common forms of wages reported by households in the sample were forestry services, manpower –based farm wages, machinery – based farm wages, wages in factories, public sectors, education, and other non –farm wages (e.g. construction). Instead of using the simultaneous equations model, the single equation model was applied to estimate the effect of land title and other related factors with help of linear least squares estimation procedure because since there were no direct relationships between land title, credit access, investment and wage income, the simple question model which included directly land title was compatible quite well (see table 10).

The estimations from the model show very interesting results and quite reasonable, though not completely in line with expectations. More detailed discussions on the estimation results will be followings. It was thought that land title would be significantly and negatively related to wage income. This expectation was developed on the assumption that those households without land title would shift their labour into wage labour instead of intensively investing their labour in farm production as compared to those who had land title. However, this hypothesis is not corroborated (see table 10).

Education and position of the head of households, and the household's labour endowment have significant and positive effects on wages income. These results imply that those households with the head attaining higher education, holding political position and with rich labour force endowment had higher income from the wages. The statistical results found here are supported by findings from interviews with villagers and observing local situation. As interpreted by villagers, education of the household head and members was a key resource which enabled them to advantages in access to jobs outside of agriculture, such as holding political position in the administration system, working for other public sectors and private non-farm sectors, such as factories. Such jobs could in turn bring them some important cash income. Labour endowment also played its crucial role in generating wages income for households. For households having a rich labour endowment, they could move part of their labour to work as farm wages and forest protection, to get jobs in factories and in other economic sectors, such as construction etc. This was a better way for them to use their excess labour more efficiently and to reduce their cash constraints. In addition, the estimations show undesired results regarding to wealth factor. The

household wealth is positively, but insignificantly related to the income from wages though the income earned from machinery – based farm wages contributed 13% to the wages income. Statistically, this is caused by autocorrelation between wealth index and some of other factors in the model.

Furthermore, the estimation results are also corresponding to what found in the current tenure literature regarding to relationships between waged income and farm size. Agricultural land and forest are significantly (at a 10% and 5% level) and positively related to the wages income. This reflects those households possessing less land have higher income from wages. Thus, since they had less land, they should reallocate their labour force into off-farm and non-farm wages in order to reduce their difficulties dealing with low income created from the farm sector. The empirical investigations are highly appropriate with our interviews with those households involving wages. As they stated they had no way other than seeking income from out of farm sector since their farm income could not meet their necessary income. Three other variables facilitating to access of extension services, input subsidies, and daily item subsidies have not significant impact on the wages income. This indicates that access to such kinds of services were not sufficient enough to reduce their wage income seeking (see table 10).

#### **(vii) Effects of land privatization on the “other sources” income**

As defined previously, the “other sources” income refers to income that derives from private transfers (gifts and remittances), public transfers (pensions and social assistance), and rental income etc. Our observation indicates among such other sources of income mentioned, in the study villages, there existed only in a form of land rental income. In addition, there were only 1.7% of households earning from such a form of income which contributed purely 0.2% to the total income, on average.

In order to estimate the effects of land titling and other related factors on such the “other sources” income, I developed a single equation model and use the linear least squares method for estimation. The estimation results (see table 11) indicate very few explanatory variables in the model significantly determined the household’s income earned from transfers and other sources. The other sources income is greater among households with the head holding political position and with land rental. These coefficients make sense if we think that income from other sources is common among those who have political position and selling out their land. However, our empirical observation points out that the other sources income among households in the study villages were generated completely from renting land out and those who rented out land were, at the same time, also those households with the head holding political position. As they reported, they had to rent their land out in order to devote time for their position in the administration.

The most expected factor, land title would have significantly impacted on the other sources income by affecting official land rental and land sale markets. Nevertheless, no formal land transfers were found in the study villages. The household's land holding and labour were expected to have negative effect and positive effect, respectively, on the other sources income due to an assumption that members of those households owning less land and plentiful labour would migrate to cities to find jobs and they, in turn, would contribute the other sources income of their family through their remittance. Subsidies, such as social assistance, would also be expected to have positive effect on the other sources income, but on evidence found on this relationship. My interviews with villagers have detected that subsidies that households received from buffer zone development projects and rural development programs were all in form of fertilizers, pesticides, crop plant and domestic animal breeds.

## **5. Primary conclusions**

In this study, we have provided an analytical framework to investigate empirically the process of implementing land privatization at a local level and rural livelihood practices as well as to measure the impact of the land privatization on household income. In order to make this empirical analysis possible, a combination of qualitative and quantitative approaches were applied. Statistically, the simultaneous equations models with helps of three – stage least squares regression method and Stata software version 8.2 were used. The models developed was based on the assumptions that land privatization by affecting land tenure security due to land property rights privatized had induced household's cheap credit access, investment incentives, and income growth. Adding to statistical estimations with the model mentioned, qualitative facts stemming from discussions with local people were used in analysis to strengthen results of estimations, on the one hand, and to reduce biases being occurred in quantitative findings, on the other hand, in the interpretations. With the empirical finding above, several important conclusions could be drawn as followings.

Firstly, despite land privatization had been carried at a large scale through nation – wide, the local practices of land allocation and titling had been dramatically varied across region, communities, and even households. In some regions, especially in the lowlands the implementation of land privatization had been quite smooth while that in the uplands, particularly in the buffer zones of protected areas had been uneven and difficult due to different hampering factors including shortcomings of land legislation and local conditions.

Secondly, the findings has shown that uplanders had nowadays no longer relied on the traditional livelihoods for their means of living, but rather they had sought their earnings from different economic activities out of farming. However, it should note that farm production had still played a key role in uplanders' livelihoods. Furthermore, the uplanders had also continued maintaining their traditional livelihoods to ensure their livelihood security and the future of family's social

economic status, on the one hand and they had also tended to practiced new income activities out of farm in order to increase cash income and reduce their difficulties caused by insufficiency of traditional livelihoods.

Thirdly, our empirical findings have shown that land privatization had well enhanced land right security to land users whose land awarded the land title. As a result, the implementation of land privatization, together with reforms of rural financial institutions, had comparatively activated formal credit markets which had opened up opportunities for farmers to gain access to the formal credit with a low interest. However, it should note that, as empirically investigated, the land title was though a prerequisite collateral by which farmers gained access to the formal credit, the credit accessibility was, at the same time, determined by other factors such as credit institutions, the functioning of formal land markets, and farmers' borrowing behavior etc. Indeed, our further findings have suggested that the farmers faced with the problem of being credit constrained postulated by the formal credit institutions, such as limitation of credit rationing (small ration and short term), complicated lending procedure such as high cost of borrowing, transaction costs concerned with paperwork, negotiation, verification of eligible borrowers, and sometimes corruption. Additionally, less activation of legal land markets in rural areas, for instance the study villages, as well as high risk due to lack of financial sanctions in a case of loan default that attenuated the lending willingness of creditors. On the side of farmers, they were insufficiently sure that they would be able to repay any loans taken as well as feared land loses due to foreclosure when they would not be able to pay back the given loans.

Despite several shortcomings being occurred in access to the formal credit by using land title as collateral, the findings have further approved that access to the formal credit provided by the state lenders had positively played a role on household investment into their economic activities and income improvement, generally. These findings have been consistent with current assumption in tenure literature and property right theory. Our findings have, however, also shown that at the same time other factors, such household resource endowments, development institutions and services, and market conditions had also had substantial influences on household investment and income.

Fourthly, in more detail manner, the findings of this work have further indicated that the land title and other related factors aforementioned played their role on different investment and income components differently, for example land title might be positively associated with crop income while negatively related to wage income. Moreover, our findings have also shown that land title also offered an initial opportunity to start a process of diversification of household income while household resource endowments were determinants of that process. In fact, the conclusion on relationships between land title and rural income diversification are still early to be drawn because our investigation, land title and household resource endowments had not had effects on all sectoral investment and income components.

Finally, with respect to relationships between land titling and land markets as explored in the tenure literature, our empirical findings have confirmed that such linkages were ambiguous. Thus, the land allocation and land titling program had not activated formal land transfer and land rental markets as one might expect while informal land transfer markets were much more active. An attempt to compare land transfers before and after land allocation and titling made has provided obvious evidence that differences in land transfers could not be found before and after implementing the land titling program. Furthermore, the empirical study has suggested that almost land transfers after land titling was illegal. Three main factors, that is, complicated administrative procedure and taxation, conservation regulation, and undeveloped economy had comparatively hampered official land markets operated smoothly and perfectly.

The above findings have certainly yielded some precise insights into the tenure literature and property rights theory. On the one hand, the findings have backed up the explorations in the tenure literature and property rights theory that land privatization and land titling quite well improve land tenure security to the land users and at the same time they also promote formal credit access, increasing investment and income growth. On the other hand, the findings have add to what have not been addressed in the mentioned literature and theory that farmers gaining access to formal credit, increasing investment, and improving income status are not only determined by land title but also greatly influenced by other factors, such as development institutions and services, household resource endowments, market conditions, simultaneously. Our empirical work have also adds more empirical explorations to the current theory that land title not only influences on investment into and income growth from farming, but also other economic sectors. In fact, a role of the land title and other mentioned factors plays on different sectoral investment and income component, differently. In addition, as discussed, our empirical findings have shown no evidence regarding to impact of land privatization and land titling on formal land markets. Therefore, more empirical studies on effects of land privatization and other mentioned factors on rural income should be widely and deeply undertaken.

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Table 3: Variable Definition

<b>VARIABLE</b>	<b>DEFINITION</b>
<b>Dependent variables</b>	
lcredit	Total amount of credit that household gain access in 2004 by land collateral
tcroinv	Investment in crop production in 2004
tcroinv_sqrt	Square _ root of investment in crop production in 2004
fish_inv	Investment in fish raising in 2004
lives_inv	Investment in livestock raising in 2004
livinv_sqrt	Square _ root of livestock investment in 2004
busi_inv	Enterprise investment in 2004
investment	A sum of component investment in 2004
inv04_sqrt	Square _ root of a sum of component investment in 2004
cro_inc	Crop income in 2004
croinc_sqrt	Square _ root of crop income in 2004
lives_inc	Livestock income in 2004
liveinc_sqrt	Square _ root of livestock income in 2004
fish_inc	Fishery income in 2004
for_inc	Forestry income in 2004
enter_inc	Enterprise income in 2004
wage_inc	Wage income in 2004
other_inc	“Other sources” income in 2004
incom_04	Total income in 2004
log_inc04	Log of total income 2004
<b>INDEPENDENT VARIABLES</b>	
edu_he	A number of educational years of the household head
position	Dummy for whether or not a household member has a political position (1= yes, 0 = otherwise)
labor	Number of household labour
log_labor	Log of number of household labour
wealth	Wealth index of household, continuous from 0 to 1
land_04	Total land that household has in 2004
land04_sqrt	Square root of total land in 2004
indcro_04	Size of industrial crop land in 2004
anland	Size of annual crop land in 2004
anland_sqrt	Square root of annual crop land in 2004
fisl_04	Size of fish ponds in 2004
agland	Size of agricultural land in 2004
agland_sqrt	Square root of agricultural land in 2004
foland	Size of forest land in 2004
lan_title	Dummy for whether or not household awarded land title (1= yes, 0= otherwise)
landb_04	Total land that household buys in 2004
lands_04	Total land that household sells or rent out in 2004
prcredit	Total amount of credit that household gain access from private lenders in 2004
extension	Dummy for whether or not household access (1= yes, 0= otherwise)
inpt_place	Places that household purchases their inputs (1= village shops, 0 = otherwise)
sell_place	Places that household sells their products (1= at farm gate, 0= otherwise)
insubsidy	Dummy for whether or not household access to input subsidies (1= yes, 0=otherwise)
itemsub	Dummy for whether household get some item subsidies (1= yes, 0= otherwise)

Table 4: Regression results explaining total income

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
lacredit						
position	1.114711	0.850495	1.31	0.1900	-0.55223	2.78165
lan_title	5.682465	0.720284	7.89	0.000	4.270735	7.094196
wealth	8.962222	2.627611	3.41	0.001	3.812199	14.11224
log_labor	0.893495	0.918734	0.97	0.331	-0.90719	2.69418
_cons	-3.61763	1.218712	-2.97	0.003	-6.00626	-1.229
inv04_sqrt						
edu_he	0.008567	0.025728	0.33	0.739	-0.04186	0.058993
inpt_place	-0.74942	0.276978	-2.71	0.007	-1.29229	-0.20656
anland_sqrt	1.800634	0.217057	8.3	0.000	1.375211	2.226058
fisl_04	2.570106	1.046772	2.46	0.014	0.51847	4.621741
indcro_04	0.348546	0.09352	3.73	0.000	0.165251	0.531841
foland	0.068759	0.070188	0.98	0.327	-0.06881	0.206324
lacredit	0.132411	0.051119	2.59	0.010	0.03222	0.232602
prcredit	0.059955	0.020764	2.89	0.004	0.019258	0.100651
log_labor	-0.29187	0.231553	-1.26	0.207	-0.74571	0.161962
wealth	-1.09674	0.786831	-1.39	0.163	-2.6389	0.445417
extension	0.351948	0.15835	2.22	0.026	0.041588	0.662308
in subsidy	-0.0752	0.184971	-0.41	0.684	-0.43773	0.287339
_cons	1.177798	0.376523	3.13	0.002	0.439828	1.915769
log_inc04						
inv04_sqrt	0.195644	0.087813	2.23	0.026	0.023535	0.367754
anland_sqrt	0.287396	0.170325	1.69	0.092	-0.04644	0.621227
indcro_04	0.089215	0.044856	1.99	0.047	0.001299	0.177131
fisl_04	0.032724	0.54182	0.06	0.952	-1.02922	1.094671
foland	0.009926	0.02991	0.33	0.740	-0.0487	0.068548
log_labor	0.342671	0.092352	3.71	0.000	0.161663	0.523678
position	0.077823	0.089449	0.87	0.384	-0.09749	0.25314
wealth	0.594378	0.300003	1.98	0.048	0.006383	1.182373
edu_he	0.023837	0.012107	1.97	0.049	0.000108	0.047566
extension	0.131829	0.077005	1.71	0.087	-0.0191	0.282755
sell_place	-0.11294	0.126842	-0.89	0.373	-0.36155	0.135665
_cons	1.325718	0.185827	7.13	0.000	0.961503	1.689932

Note \*, \*\*, and \*\*\* denote the significant levels of 10%, 5%, and 1%, respectively

**Table 5: Regression results explaining crop income**

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
lcredit						
position	1.024901	0.844052	1.21	0.225	-0.62941	2.679211
lan_title***	5.760489	0.716408	8.04	0.000	4.356355	7.164624
wealth***	8.991217	2.627378	3.42	0.001	3.841651	14.14078
log_labor	0.887204	0.918592	0.97	0.334	-0.9132	2.687612
_cons***	-3.64574	1.218435	-2.99	0.003	-6.03383	-1.25765
tcroinv_sqrt						
edu_he	0.008813	0.022547	0.39	0.696	-0.03538	0.053004
inpt_place***	-0.61867	0.215652	-2.87	0.004	-1.04134	-0.196
indcro_04***	0.431114	0.077048	5.6	0.000	0.280103	0.582125
anland_sqrt***	2.041841	0.188907	10.81	0.000	1.671591	2.412091
lcredit**	0.086389	0.038469	2.25	0.025	0.010992	0.161786
prcredit	0.026383	0.0171	1.54	0.123	-0.00713	0.059899
log_labor	0.068289	0.19558	0.35	0.727	-0.31504	0.451618
wealth	-1.07087	0.701239	-1.53	0.127	-2.44528	0.303532
extension*	0.263228	0.141634	1.86	0.063	-0.01437	0.540826
_cons	0.30901	0.313782	0.98	0.325	-0.30599	0.92401
croinc_sqrt						
tcroinv_sqrt***	0.803813	0.18278	4.4	0.000	0.44557	1.162055
position**	-0.38596	0.170317	-2.27	0.023	-0.71978	-0.05215
wealth**	1.467893	0.637107	2.3	0.021	0.219187	2.716599
edu_he	-0.00014	0.023989	-0.01	0.995	-0.04716	0.046875
log_labor	0.060207	0.19265	0.31	0.755	-0.31738	0.437794
agland_sqrt**	0.912875	0.375983	2.43	0.015	0.175961	1.649788
sell_place*	-0.37603	0.202614	-1.86	0.063	-0.77315	0.021084
extension	0.000843	0.143825	0.01	0.995	-0.28105	0.282735
insubsidy	0.080503	0.155536	0.52	0.605	-0.22434	0.385349
_cons	-0.41293	0.313083	-1.32	0.187	-1.02656	0.200703

Note \*, \*\*, and \*\*\* denote the significant levels of 10%, 5%, and 1%, respectively

**Table 6: Regression results explaining livestock income**

	Coef.	Std. Err.	z	P> z	[95% Conf.	Interval]
lacredit						
position	1.322627	0.811251	1.63	0.103	-0.2674	2.912649
lan_title	5.596877	0.716703	7.81	0.000	4.192164	7.00159
wealth	8.89315	2.626215	3.39	0.001	3.745863	14.04044
log_labor	0.887219	0.918567	0.97	0.334	-0.91314	2.687577
_cons	-3.58424	1.218355	-2.94	0.003	-5.97217	-1.1963
livinv_sqrt						
edu_he	0.015659	0.024889	0.63	0.529	-0.03312	0.064441
land04_sqrt	0.475795	0.158124	3.01	0.003	0.165878	0.785713
lacredit	0.164513	0.047019	3.5	0	0.072358	0.256668
prcredit	-0.00756	0.017414	-0.43	0.664	-0.04169	0.026569
log_labor	-0.39147	0.230185	-1.7	0.089	-0.84263	0.05968
wealth	-0.46056	0.79311	-0.58	0.561	-2.01503	1.093902
extension	0.251841	0.15218	1.65	0.098	-0.04643	0.550108
inpt_place	-0.10293	0.24814	-0.41	0.678	-0.58928	0.383412
_cons	0.331285	0.341776	0.97	0.332	-0.33858	1.001155
liveinc_sqrt						
livinv_sqrt	1.126308	0.122717	9.18	0	0.885786	1.366829
wealth	-0.21514	0.344837	-0.62	0.533	-0.89101	0.460727
log_labor	-0.09579	0.101994	-0.94	0.348	-0.2957	0.104113
edu_he	0.005504	0.013932	0.4	0.693	-0.0218	0.03281
position	0.011106	0.091895	0.12	0.904	-0.16901	0.191217
land04_sqrt	-0.1335	0.079192	-1.69	0.092	-0.28871	0.021716
extension	-0.09921	0.082505	-1.2	0.229	-0.26092	0.062497
sell_place	-0.03305	0.125483	-0.26	0.792	-0.27899	0.21289
insubsidy	-0.06085	0.083125	-0.73	0.464	-0.22377	0.102071
_cons	0.46397	0.177257	2.62	0.009	0.116553	0.811387

Note \*, \*\*, and \*\*\* demote the significant levels of 10%, 5%, and 1%, respectively

**Table 7: Regression results explaining fishery income**

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
lacredit					
position*	1.476393	0.869447	1.7	0.089	-0.22769 3.180478
lan_title***	5.436405	0.716759	7.58	0.000	4.031583 6.841226
wealth***	8.844056	2.628305	3.36	0.001	3.692672 13.99544
log_labor	0.903885	0.918588	0.98	0.325	-0.89651 2.704284
_cons***	-3.52715	1.218549	-2.89	0.004	-5.91546 -1.13883
fish_inv					
edu_he	-0.00379	0.020043	-0.19	0.85	-0.04308 0.035492
inpt_place*	-0.30406	0.17994	-1.69	0.091	-0.65673 0.048616
fisl_04***	2.692828	0.770468	3.5	0.000	1.182738 4.202917
lacredit	-0.01973	0.027289	-0.72	0.47	-0.07322 0.033755
prcredit*	0.023966	0.014376	1.67	0.095	-0.00421 0.052141
log_labor	-0.13723	0.163066	-0.84	0.400	-0.45684 0.182368
wealth	-0.03165	0.521537	-0.06	0.952	-1.05385 0.990542
extension	-0.09433	0.124093	-0.76	0.447	-0.33754 0.148889
insubsidy	-0.13074	0.124743	-1.05	0.295	-0.37523 0.113753
_cons*	0.469095	0.262174	1.79	0.074	-0.04476 0.982945
fish_inc					
fish_inv	1.959207	1.258098	1.56	0.119	-0.50662 4.425034
fisl_04**	8.725713	3.86557	2.26	0.024	1.149336 16.30209
log_labor	0.250859	0.424423	0.59	0.554	-0.58099 1.082713
wealth	-0.23213	1.115819	-0.21	0.835	-2.41909 1.95484
edu_he	0.047999	0.047232	1.02	0.310	-0.04457 0.140571
position	0.407176	0.277404	1.47	0.142	-0.13652 0.950877
extension	0.35026	0.307975	1.14	0.255	-0.25336 0.95388
sell_place	0.0572	0.345014	0.17	0.868	-0.61901 0.733415
_cons	-0.66061	0.751871	-0.88	0.38	-2.13425 0.813032

Note \*, \*\*, and \*\*\* denote the significant levels of 10%, 5%, and 1%, respectively

**Table 8: Regression results explaining forestry income**

for_inc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
edu_he*	-0.13668	0.074235	-1.84	0.068	-0.28378 0.010424
log_labor	-0.07065	0.578221	-0.12	0.903	-1.21644 1.075134
wealth	-1.11049	1.662398	-0.67	0.506	-4.40464 2.183666
lan_title*	-1.01559	0.611694	-1.66	0.100	-2.22771 0.196518
foland***	1.632628	0.181655	8.99	0.000	1.272665 1.99259
sell_place***	1.870478	0.615059	3.04	0.003	0.651698 3.089258
extension	0.174718	0.435249	0.4	0.689	-0.68776 1.037192
_cons**	2.276817	0.947497	2.4	0.018	0.39929 4.154345

Note \*, \*\*, and \*\*\* denote the significant levels of 10%, 5%, and 1%, respectively

**Table 9: Regression results explaining enterprise Income**

	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
lacredit						
position	1.504541	0.870672	1.73	0.084	-0.20194	3.211025
lan_title***	5.420303	0.717044	7.56	0.000	4.014922	6.825685
wealth***	8.834797	2.628353	3.36	0.001	3.68332	13.98627
log_labor	0.904025	0.918623	0.98	0.325	-0.89644	2.704493
_cons**	-3.52112	1.218566	-2.89	0.004	-5.90946	-1.13277
busi_inv						
edu_he	0.047304	0.098917	0.48	0.632	-0.14657	0.241176
position	-0.63803	0.774032	-0.82	0.41	-2.15511	0.879043
land04_sqrt***	-1.88346	0.583068	-3.23	0.001	-3.02625	-0.74066
lacredit	0.018107	0.086427	0.21	0.834	-0.15129	0.187501
prcredit***	0.331871	0.075157	4.42	0.000	0.184567	0.479175
log_labor	-0.29797	0.825111	-0.36	0.718	-1.91516	1.31922
wealth	1.969983	2.763022	0.71	0.476	-3.44544	7.385407
insubsidy	-0.53901	0.468856	-1.15	0.25	-1.45795	0.379932
extension	-0.13807	0.619713	-0.22	0.824	-1.35269	1.076543
_cons**	2.415004	1.200341	2.01	0.044	0.06238	4.767628
enter_inc						
edu_he	0.00277	0.118019	0.02	0.981	-0.22854	0.234082
position	0.726012	0.960916	0.76	0.45	-1.15735	2.609373
log_labor	-0.03117	0.985317	-0.03	0.975	-1.96235	1.900019
wealth	-0.39266	3.169436	-0.12	0.901	-6.60464	5.819319
busi_inv***	1.530738	0.297662	5.14	0.000	0.947331	2.114145
land04_sqrt**	1.641563	0.825835	1.99	0.047	0.022956	3.260169
extension*	1.416869	0.753237	1.88	0.060	-0.05945	2.893186
_cons*	-2.79754	1.618154	-1.73	0.084	-5.96906	0.373989

Note \*, \*\*, and \*\*\* denote the significant levels of 10%, 5%, and 1%, respectively

**Table 10: Regression results explaining wage income**

wage_inc	Coef.	Std. Err.	t	P> t	[95% Conf. interval]	
edu_he***	0.473836	0.171531	2.76	0.007	0.133833	0.81384
position*	2.415522	1.23355	1.96	0.053	-0.02959	4.860632
log_labor***	6.237604	1.322497	4.72	0.000	3.616186	8.859021
wealth	2.076164	4.2103	0.49	0.623	-6.26938	10.42171
lan_title	-0.81877	1.209908	-0.68	0.500	-3.21702	1.579474
agland_sqrt*	-2.23252	1.139008	-1.96	0.053	-4.49023	0.025189
foland*	-1.00924	0.405863	-2.49	0.014	-1.81373	-0.20474
extension	1.179646	0.99564	1.18	0.239	-0.79389	3.153177
insubsidy	1.054908	1.146584	0.92	0.360	-1.21782	3.327637
itemsub	1.125928	1.228683	0.92	0.362	-1.30954	3.56139
_cons	-3.07031	2.219045	-1.38	0.169	-7.46884	1.328227

Note \*, \*\*, and \*\*\* denote the significant levels of 10%, 5%, and 1%, respectively

**Table 11: Regression results explaining transfers and other sources income**

other_inc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
edu_he	-0.00577	0.013944	-0.41	0.680	-0.03341	0.021865
position*	0.236728	0.098362	2.41	0.018	0.041777	0.431679
lan_title	0.067973	0.093153	0.73	0.467	-0.11665	0.252598
log_labor	-0.11114	0.104823	-1.06	0.291	-0.31889	0.09662
wealth	0.036332	0.325044	0.11	0.911	-0.60789	0.680559
insubsidy	-0.07128	0.093013	-0.77	0.445	-0.25563	0.113068
land04_sqrt	-0.04708	0.074873	-0.63	0.531	-0.19548	0.101317
landb_04	-0.01	0.081409	-0.12	0.902	-0.17135	0.151347
lands_04*	0.355941	0.146577	2.43	0.017	0.06543	0.646452
_cons	0.174685	0.153142	1.14	0.257	-0.12884	0.478207

Note \*, \*\*, and \*\*\* demote the significant levels of 10%, 5%, and 1%, respectively