# Does Land Conflict Matter to Farm Productivity? A Case Study of Cambodia

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ABSTRACT

*Land-related conflicts in Cambodia have been garnering much attention. The Cambodian government, through the Prime Minister, pledged to resolve land-related disputes, as they not only hurt the people but negatively impact on the national development agenda. Land disputes are estimated to involve 200,000 poor Cambodians. The government has been urged by international aid agencies to solve land problems to aid rural development and alleviate poverty. This paper evaluates the determinants of land conflict and its impact on land productivity, and provides recommendations on land governance in Cambodia, using an extensive 2004 nationwide household survey data consisting of 15,000 households in 600 rural and 300 urban villages.*

*In the face of a growing landless population, primarily with loss of ownership by female-headed households, this study finds evidence that suggests other approaches for policymakers in preventing a growing landless population and land conflict prevention. It was also found out that modalities of acquisition are not a dominant cause of land conflict, while posessing land title reduces the probability of getting one's land into dispute.*

*The analysis finds evidence of negative impact of land conflicts on farm productivity. This finding supports the hypothesis of the study and confirms the downward spiral events of conflicts that impact on farm productivity. The most involved in land-related conflicts are agricultural lands, which may signify the community's risk for low land productivity. The numerous land grabbing incidents in Cambodia may also lead to land conflicts. There is urgent call for the Cambodian government to solve land conflicts or improve land governance not only for agricultural development, but also for Cambodians' rights over their lands. The impetus of resolving land issues, especially in rural Cambodia, will contribute to more effective poverty reduction efforts.*

**Keywords:** land productivity, land conflict, land title, Cambodia
**JEL Classification:** Q1, Q10, Q15

## INTRODUCTION

Although Cambodia has a thin population density compared to its neighboring countries,[1] its land value is increasing and land scarcity is an emerging issue for subsistence and commercial agriculture, as well as for the housing demand of a burgeoning population. At the same time, agriculture is the pillar of Cambodia's economy. Agriculture revenue contributes about 84 percent to the Gross National Product (GNP) of Cambodia and it is the main source of livelihood of 80 percent of rural Cambodians (ADB 2001). Centralized land management under the Collectivism regime for the period 1975–1989 had failed, resulting in poorly managed agricultural irrigation and infrastructure (Williams 1999). Additionally, the introduction of private land ownership and free-market adoption[2] in the 1990s put increasing pressure on land demand. Thus, relevant government interventions for land-related issues are crucial to making the most out of Cambodia's land resources.

The issues of concern discussed in this paper are incidence of land conflict; female-headed household and landless population vulnerabilities to land disputes; and land right security (such as land title) in Cambodia. If those were left unaddressed, they will slow down the development processes.

Land disputes started after the fall of the Khmer Rouge regime, when the refugees returned to their villages and reclaimed their lands that were once seized by the government and were made into official property of the state. In 1989, the government of Cambodia redistributed the state land properties back to small farmers in accordance with household size, resulting in roughly equal land size. However, the refugees who came back later than 1989 did not receive any land from the government. They tried to reclaim their previously owned lands prior to the Khmer regime. This type of claim has resulted in land-related incidences of conflict with authorities. Land disputes involving authorities is the second main reason of land-related conflicts in Cambodia.[3]

Another type of land conflict relates to so-called "economic concession" boundaries with villagers. Through economic concessions, the government granted land to large timber industries to use land for productive activities. These lands were adjacent to villagers' lands. However, through time, authorities have neglected the agreed boundaries and set the economic concession areas within the villager's land boundaries.

Meanwhile, land market liberalization has led to increasing land values and urged Cambodians to secure their land rights to facilitate land transfers. Yet, the lack of land right security covering all Cambodians and lack of responsive formal institutions have led to a growing number of land conflicts (Cooper 2002). Despite the enactment of land policy reform in 2009, Cambodia's land rights problems continue unabated. Un and So (2011) found that the central premise is that although past collectivization and weak governmental institutions have contributed to land rights issues, it is neopatrimonialism—a mechanism that dictates political interaction among the elites and between the elites and the electorate and resources governance and distribution—that perpetuates land rights problems and limits land policy reform.

1 Cambodia's population density is 71 inhabitants/km$^2$, whereas Thailand and Vietnam are 118 and 221 inhabitants/km$^2$, respectively in 2000 (United Nations 2004)

2 Free-market adoption entails that citizens can sell and purchase land freely.

3 Data analysis based on the Socio-Economic Survey 2003-2004 of Cambodia (National Institute of Statistics. 2004)

Furthermore, the political nature of land grabbing threatens land use among the poor. The state has failed to stop false categorization of land, which has allowed land grabbing to flourish. Marginal, idle, or degraded lands created opportunities for rural investment in Cambodian economic development. However, the false categorization of household lands as unproductive lands has encouraged land grabbing and resulted in unresolved conflicts with locals. Locals usually grow paddy rice, graze their livestock, and access water on forest resources that are connected to the land with or without state documentation (Schneider 2011).

The Cambodian government, through the Prime Minister, has pledged to solve land-related disputes because it does not only hurt people but also jeopardizes the national agenda, particularly agricultural development (Samdech 2007). Oxfam estimates that land disputes in Cambodia involve 200,000 poor Cambodians (Cooper 2002). International aid agencies have urged the Cambodian government to solve land problems in order to promote rural development and alleviate poverty. Literature on land issues has numerous studies on the impact of both land titles and land ownership on agricultural performance (Myyra et al. 2005; Zhang and Aboagye Owiredu 2007; Bandiera 2007; Smith 2004). However, assessment of the impact of land conflict beyond a descriptive analysis is limited.[4]

This study aims to analyze the impact of land conflict on agricultural productivity, particularly on land productivity. To do so, it utilizes the data of an extensive nationwide household survey conducted in Cambodia in 2004.

4 Exceptions include Raffaella (2006), and Amman and Duaraiappah (2004), which analyzed the data from Uganda and Kenya, respectively.

## BACKGROUND AND CONCEPTUAL FRAMEWORK

In the context of Cambodia, this study tested the hypothesis that land conflict will negatively impact land productivity. The findings of this study can provide useful recommendations to policymakers in solving land-related conflicts in Cambodia.

### Land-Related Issues in Cambodia

It is first useful to put into a broader context the increasing value of land, land scarcity, and land right security in the case of Cambodia. The combination of changes in these issues has resulted in the increase of land-related disputes. These disputes have become the focus of current policies and debates on land governance and management in Cambodia (Cooper 2002; STAR Kampuchea 2007).

Land security is the main issue in land-related conflict. While a titling program was implemented in 1990 to record all individuals' landholdings, progress had been slow due to sporadic processes and the lack of human capital to implement nationwide land database records (So et al. 2001). Only half a million plots (around 12-13% of total land parcels) have been granted formal titles for the period 1990-2000. Yet, one might ask, to what extent could a titling program improve agricultural productivity? A World Bank study (2006) found that the titling program impacts positively on productivity. It showed that a plot with title had productivity higher by 65 percent than that without title. This suggests that secured land rights incentivize land owners to invest on their land, and eventually increase the yield.

Despite government efforts in enhancing the people's land rights security, the number of land disputes continues to increase, involving 4 percent of the total population of Cambodia (Cooper 2002). Land conflicts may also be a result of land seizure by the authorities or the

military, boundary conflict, and conflicts with relatives or other people. The two main reasons are: lack of secure land rights and unresponsive legal system (Phann 2006), and land grabbing for rural economic expansion (Schneider 2011).

In the 1990s, the government attempted to boost national economic growth through agriculture by granting long term leases on large tracts of land to private industries, known as economic concession for agricultural and large-scale forest production. The sizes varied from 10,000 ha to 315,000 ha (Munro-Faure 2006), while the average Cambodian household possessed only about 1.3 ha (So et al. 2001; Sik 2000). The debate centered on the program's effectiveness for agricultural growth. About 54 out of 64 concessions were left idle since the 1990s (Munro-Faure 2006). These could still be involved in prolonged disputes with locals due to false categorization of idle lands, when in fact, the fertile plots belong to households, but without proper titles.

The government's seeming disregard of the traditional land system has exacerbated land disputes. When the authority granted a concession, it was done so without a clear demarcation from the existing traditional land system. For instance, in the northeastern parts of Ratanakiri and Mondulkiri provinces, there are 17 indigenous groups with their own respective land rules (Cooper 2002). The Land Law was revised for the second time and passed in 2001, recognizing indigenous land management, but unfortunately, no formal titles were issued to these indigenous groups. This policy has forced rural people with traditional systems to lose their lands to private, wealthier entities. These indigenous groups are still vulnerable to losing their lands due to commercial expansion or state interests. This unresolved problem of land disputes could slow down progress.

In Cambodia, a growing number of people without any kind of land ownership, despite their dependency on agricultural income, reached 12-15 percent of the total population (So et al. 2001). Women in particular, have a weaker position in land ownership (Chan 2001; Schultz 1999); the land certificates are with the male relatives. If a woman's spouse dies in war or illness, she will have a higher likelihood of losing or having conflict over her land because her husband's relatives will often try to claim it, especially if the woman does not have children (Sik 2000). The Land Law enacted in 1992 is not comprehensive because it does not support women's position on securing their land rights (Williams 1999). This study seeks to determine whether or not a female-headed household is prone to land conflicts.

Some interventions are needed to strengthen women's position with respect to land access. About 50 percent of the widow population is considered landless (STAR Kampuchea 2007). This implies that culturally, women are given a weak position in land ownership, thereby significantly contributing to the number of landless people. Notably, 13 percent of the landless population is caused by expropriation. To the extent that landless and female-headed households contribute to the likelihood of a land dispute, this would slow down attempts to alleviate poverty, which Cambodia had committed to reduce by 50 percent in 2010 (World Bank 2006).

A growing landless population is also a result of the subdivision of land from main households to new households. Landless is defined as households with a plot size of less than 0.5 ha. Often, land parcels become smaller because the grown children of a farm family prefer to build houses on their own land and own a farmland, rather than live in the main household with their parents.

In early 2000, it was proposed that "idle concession lands" be redistributed to landless people (Munro-Faure 2006). As a result, in 2003, the government passed a law to redistribute land to the poor. However, the process has been

slow and none of the concession lands has been redistributed to small farmers to this date.

A household with land conflicts often experiences a downward spiral of events even if the conflict is resolved. A household may lose its opportunity of earning income due to the time spent resolving a land conflict. People have to file a protest with the central government when their land is seized, a process that can take a long time. Moreover, land under conflict might have some production issues, brought about by the uprooting of trees, periods of abandonment, or being left fallow.

Provided that there is aggressive government effort in implementing the new Land Law, quantitative evaluation of the incidence of land conflict and its impact on productivity could help policymakers draw relevant interventions to solve them.

## Research Question and Hypotheses

### *Are women more vulnerable to land disputes than men?*

In traditional law, a woman's right to land inherited from her parents will weaken if she is childless upon the death of her husband. The absence of a land ownership document usually leads to land conflicts with male family members. The revised Land Law enacted in 1999 took into consideration a woman's position after the death of her spouse. The cross-sectional data from the 2004 national survey were utilized to determine the vulnerability of a woman's position in the context of land conflict incidence.

### *Does near landlessness affect a household's probability of getting into conflict?*

The growing landless population is a result of either subdivision of the main parcel or of land-related conflicts, thereby becoming a concern for policy debate in Cambodia (Cooper 2002).

### *Are landless households more prone to land conflicts?*

This question will be answered by estimating the determinant of land conflicts and how these covariates impact the likelihood of land conflicts.

### *Does land conflict negatively impact farm productivity?*

Land disputes, whether solved or pending, result in losses for the household and decrease in land productivity. On a larger scale, conflict ultimately slows socioeconomic development, e.g., via rent dissipation due to conflict. A pending conflict may cause the land owner to lose access to their land, eventually leaving land fallow. In Cambodia, one of the major reasons of land conflicts is land grabbing either by other entities or by the state for economic expansion. In some cases, the state wrongly categorized untitled lands into unproductive lands, making them prone to land grabbing. However, these lands belong to households. The econometric analysis in this study seeks evidence of this ambiguity.

## Estimation Strategy

### *Determinants of land conflicts*

The logit model generates consistent estimates for binary outcomes (Cameron and Trivedi 2009). The dependent variable is a dummy binomial variable, equal to 1 if the plot is affected by conflict, and 0 if otherwise.

The logit model on determinants of land conflict is specified as:

$$C_{ij}=\beta_0+\beta_1 \cdot X_i+\beta_2 \cdot L_j+v_{ij} \quad (1)$$

where:

$C_{ij}$ Denotes conflict status (as 1 and 0) of plot $j$ at household $i$

$X_i$ Denotes characteristics of household (HH) *i*, e.g., female as HH head, age of HH head, and near landless dummy

$L_j$ Denotes attributes of plot *j*, e.g., household land endowment, acquisition mode, presence of title, land type, length of land ownership, rural (dummy)

$v_{ij}$ Error term

The key variables affecting the probability to have land conflict were found to be: female-headed HH, age of HH head, landless status, and length of ownership plot, *L* plot characteristics, i.e., *chamkar* type, with title, dry season, type of land, in rural area, and modality of land acquisition. *Chamkar* land type is usually planted to perennial trees such as nuts and/or fruit-bearing trees, and is near a home site.

***Impact of land conflicts on farm productivity***

To evaluate the impact of conflict on production outcome (measured as output value in USD per hectare), key variables were estimated using the augmented Cobb Douglas production function (Castagnini and Deininger 2006):

$$Y_j=\theta_0 + \theta_1 X_i + \theta_2 L_j + \theta_3 C_j + \varepsilon_{ij} \quad (2)$$

where:

$Y_j$ Denotes the output value per hectare of plot *j* (USD/ha)

$X_i$ Denotes characteristics of household *i*, e.g., female as HH head, age of HH head, education level of HH head, cattle ownership, buffalo ownership, non-agricultural income, and household size

$L_j$ Denotes attributes of plot *j*, e.g., plot size, household land endowment, land type, rural, crop grown, investment made on plot, and fertilizer input

$C_j$ Denotes land being in conflict, instrumented by the probability of conflict (Angrist 1991)

where:

$$C_j = b_0 + b_1 X_i + b_2 L_j + b_3 Z_j + u_{ij} \quad (3)$$

$\varepsilon_{ij}$ Error term

In order to produce consistent estimates, the righthand side of the equation (2) must be completely exogenous. Performing Ordinary Least Square (OLS) on Equation (2) will yield biased estimates. Therefore, Two Stage Least Square (2SLS) is employed to solve Equation (2), using Equation (3). *Z* denotes instrumental variables that affect conflicts but not productivity. For this study, these variables are: modalities of acquisition, land tenure, distance to home (chamkar land).[5] Literature suggests that using instrumental variable technique for the treatment (which is of being in a conflict or not) yields consistent estimates (Angrist 1991). *X* denotes characteristics of household *i*, e.g., female as HH head, age of HH head, education level of HH head, cattle ownership, buffalo ownership, non-agricultural income, and household size. *L* is plot size, household land endowment, land type, rural, crop grown, investment made on plot, and fertilizer input.

## Data and Descriptive Evidence

***Data sample***

The data samples used in this study are drawn from the 2004 national survey of Cambodia funded by the World Bank (National

5 In this study, rural attribute acts as instrumental variables (IV) bacause many land grabbing incidents and land conflicts happened in the rural areas, meant for rural economic expansion (Phann 2006; Schnieder 2011).

Institute of Statistics 2004). The dataset consists of samples from 300 urban and 600 rural villages, involving 15,000 households. A household owns one or more plots, and the land size varies greatly across households, ranging from 0.5 ha to more than 10,000 ha. The total number of plots is 24,513. Of these plots, 363 were reported to be involved in land conflict, which were either solved or in pending status during the survey.

The nationwide coverage and comprehensiveness of this dataset makes it a strong tool to analyze land related interventions and their impacts on Cambodian livelihoods. However, the weakness of this dataset is that it does not contain detailed information on how land change has affected households that have struggled with monetary loss, violence, social disorder, and decreasing farm output. Nevertheless, this limitation still allowed the conduct of a rigorous analysis of land conflict impact in the absence of other studies on Cambodia. Thus, this study will benefit existing land managers in crafting intervention strategies for land disputes to alleviate poverty in Cambodia.

### *Statistics and descriptive evidence*

To recount the evidence of land incidence and its impact on farm productivity, descriptive statistics from household and plot levels are presented. The household data provides information on household head's gender, education, age, size, income, assets, access to credit, consumption, and health level. The plot data have information on land characteristics, land market participation, land right characteristics, land conflict, output value per hectare, land inputs, and the household head's willingness to pay (WTP) for own plot.

Table 1 provides general information on the survey sample. The average household size is five, the household head's average age is 45 years, and has 6.4 years of schooling. Some 22 percent of 14,984 households are headed by females.[6] The high proportion of female-headed households might be a result of the long internal unrest in Cambodia, where more men were killed during the war (Cooper 2002).

### *Land endowment and plot characteristics*

Table 2 provides descriptive data at the plot level. The average land endowment is 1 ha nationwide. However, this number is smaller in urban areas (0.55 ha) than in rural areas (1.17 ha), considering that the market value of land in the urban area is higher than in the rural area (Table 1). The near landless population figure reinforces this situation and consists of 77 percent urban inhabitants and 47 percent rural dwellers. Most probably, urban people use land primarily for residence, as the number of rural people sharing agricultural income (0.60) is higher than that of urban people (0.28). The ratio reverses in the case of non-agricultural income. Urban people may have more off-farm jobs than farm jobs to sustain a more expensive lifestyle. The average length (in years) of a household head's education in urban areas is 7.8, which is slightly higher than that of a rural person (six years), indicating that those who have higher income have better chance of higher educational attainment.

The descriptive data on livestock ownership (buffalo and swine) shows that households without land conflict have a higher percentage of livestock ownership than those with land conflict. This may imply that households with less land conflict engage more in livestock raising as source of income, than those with more land conflict. It as also possible that households involved in land conflict have left the land fallow and raised livestock instead, similar to a case in Uganda (Castagnini and Deininger 2006).

6 Source: Calculation based on the 2003-2004 Cambodia Socio-Economic Survey (National Institute of Statistics 2004)

**Table 1. Descriptive statistics of the households**

| | Has Conflict | No Conflict | Total | Sig | Rural | Urban | Total | Sig |
|---|---|---|---|---|---|---|---|---|
| Household size | 5.31 | 5.15 | 5.15 | | 4.91 | 5.08 | 4.95 | *, ** |
| Female headed HH (%) | 0.18 | 0.19 | 0.18 | | 0.22 | 0.24 | 0.22 | *, ** |
| Head's age (mean) | 46.74 | 46.74 | 45.63 | | 44.76 | 46.69 | 45.14 | *, ** |
| Head's education | 5.91 | 5.96 | 5.96 | | 6.03 | 7.82 | 6.43 | *, ** |
| Number of plots (mean) | 2.21 | 2.50 | 2.49 | ** | 1.17 | 0.55 | 1.05 | *, ** |
| Land endowment (Ha) | 2.09 | 1.73 | 1.74 | | 1.89 | 1.62 | 1.86 | *, ** |
| Near Landless (%) | 0.47 | 0.62 | 0.61 | * * | 0.47 | 0.77 | 0.53 | *, ** |
| Marital Status (%) | 0.83 | 0.80 | 0.83 | | | | | |
| Rural (%) | 0.88 | 0.92 | 0.92 | * * | | | | |
| Total income (mean, USD) | 718 | 1345 | 729 | | 714 | 2533 | 1078 | *, ** |
| Agriculture (%) | 0.58 | 0.69 | 0.69 | | 0.60 | 0.28 | 0.53 | *, ** |
| Non-agriculture (%) | 0.11 | 0.44 | 0.11 | * * | 0.18 | 0.33 | 0.21 | *, ** |
| Miscellaneous (%) | 0.09 | 0.04 | 0.09 | | 0.08 | 0.11 | 0.09 | |
| Possession of livestock | | | | | | | | |
| Number of cattle | 1.98 | 2.27 | 1.99 | * * | | | | |
| Number of buffaloes | 0.46 | 0.60 | 0.46 | * * | | | | |
| Number of pigs | 1.37 | 1.33 | 1.37 | | | | | |

Note: *** significant at 1 percent; ** significant at 5 percent; * significant at 10 percent

The perhaps surprising result is that land plots under conflict yield lower than one-fourth of output value per hectare (USD 329), compared to plots not under conflict (USD 1,254). This gives preliminary evidence of negative impact of land conflict incidence to productivity. The land size endowment of a household with conflict is larger (2.1 ha) than those without conflict (1.7 ha). To test the hypothesis that land conflict impacts negatively on land productivity, a carefully-specified econometric model is vital.

Several interesting descriptive pieces of evidence are noted. First is the length of land ownership. The data indicate a significant difference in length of ownership between non-conflict (16.7 years) and those with conflict (15.3 years) plots. The data confirms the perception that longer ownership conveys a more secure land right. The second evidence pertains to irrigation, whereby non-conflict land has bigger percentage of irrigation in the dry season (10.4%) than that of land in conflict (9.4 %). Similarly, irrigation during wet season in a non-conflict plot (22%) is higher than those in conflict (19%). As to the type of crop grown on the plot, less conflict plot incentivizes the owner or the tenant to plant trees, a long term crop (9.6% compared to 7.2%). Trees may also act as land investment due to its function of strengthening crop roots and sustaining soil fertility. In contrast, rice crop is grown more in plots with conflict (77.8%) than those without (73.6%).

Furthermore, dry land and *chamkar* land have higher portions of no-conflict compared to conflict lands (14% compared to 11%) and (15% compared to 14%), respectively. Literature on Cambodian land issues suggest that dry season land is cultivated in dry season and most probably flooded by Tonle Sap Lake during the wet season. Thus, this type of land receives natural fertilizer out of the flood (World Bank 2006). This gives rise to the assumption that dry land type is more prone to conflict due to its soil quality (e.g., fertility). Insofar as *chamkar*

land is concerned, Cambodians usually have plots near their houses planted to nuts, fruits, and other crops except rice. Since this land is close to the land owner, it is less likely to get into conflict.

**Table 2. Descriptive evidence at land-plot level[1]**

| | Has Conflict | No Conflict | Sig |
|---|---|---|---|
| Value of output /ha (USD) | 329 | 1254 | |
| Plot size (ha) | 2.089 | 1.734 | |
| Length of ownership (years) | 15.343 | 16.743 | ** |
| Land irrigated in dry season (%) | 0.094 | 0.104 | |
| Land irrigated in wet season (%) | 0.196 | 0.228 | |
| Planting perennial trees/crops (%) | 0.072 | 0.096 | |
| Planting rice crop | 0.778 | 0.736 | |
| Dry season land (%) | 0.119 | 0.140 | |
| *Chamkar* (cash crop) land (%) | 0.142 | 0.152 | |
| Has document certifying ownership (%) | 0.251 | 0.244 | |
| Has land title (%) | 0.215 | 0.160 | ** |
| Has land investigation paper (%) | 0.110 | 0.140 | |
| Has application receipt (%) | 0.011 | 0.014 | |
| Modalities of acquisition[2] | | | |
| Given by the state (%) | 0.394 | 0.455 | ** |
| Inherited from relatives (%) | 0.353 | 0.320 | |
| Purchased (%) | 0.127 | 0.062 | ** |
| Rented (%) | 0.499 | 0.538 | ** |
| Tonle Sap zone (%) | 0.380 | 0.305 | ** |
| Rural (%) | 0.884 | 0.918 | ** |
| Investment made on the plot (%) | 0.174 | 0.124 | ** |

Notes:

[1] The percentage of plot attributes can add up to more than one between the plots with conflict and those without conflict will add up to one within the same group. For example, plots in rural areas with conflicts is 88.4 percent and plots in urban areas with conflicts is 11.6 percent. However, rural plots are dominant in both groups, with and without land conflicts.

[2] Modalities are mutually exclusive because the attributes are at plot level. The modalities can add up to more than one because respondents can have more than one plot, and respondents reported that each owned plot may have different acquisition modalities.

** significant at 5 percent

Interestingly, only 50 percent of the plots have documents certifying land rights, including title and informal papers. Additionally, only 21 percent of total plots have titles that certify rights over the land. However, despite the presence of a title, which is recognized as the most secure document of rights, some 16 percent of such plots are involved in conflict. Another reason for land disputes, other than land right security, is land grabbing by wealthy individuals due to corrupt government officers and a weak land legal system in Cambodia (Cooper 2002; Phann 2006).

The major modalities of land acquisition are (1) given by the state, (2) inherited from family, (3) purchased, and (4) rented. The high percentage of rent modality indicates that the land market is functioning in Cambodia. On the other hand, lands acquired through purchase have a tendency of being in more conflict than

other acquisition modes. Table 2 shows that almost double the percentage of purchased land are involved in conflict (12.7% purchased land have conflict, and 6% have no conflict). Lastly, more land-related conflicts happened in urban (92%) than in rural areas (88%).

## ECONOMETRIC RESULTS AND DISCUSSION

Applying the econometric model outlined earlier, this study arrived at three main findings: (1) female-headed households have an insignificant vulnerability to land conflict, contrary to what has been previously suspected; (2) landlessness negatively impacts on land-related conflicts; and (3) modalities of acquisition such as "given by state" is an insignificant factor of land conflict. Moreover, land title reduces the probability of land conflicts. The title provides security of land right for Cambodians and signifies non-involvement in land-related conflict.

### Determinants of Land Conflict

Table 3 presents a cross-sectional analysis of land conflict determinants, where the dependent variable is 1, if land has ever been involved in conflict, and 0, if otherwise. Using a logit model applied to equation (1), it will yield consistent estimates of the righthand side variables. The following are some of the notable results of the study: (1) a female-headed household is not likely to impact on land conflict; (2) household head's age and length of ownership reduce probability of land conflict; and (3) the presence of a title significantly lowers the likelihood of a dispute.

***Near-landlessness impacts negatively on the probability of being in conflict.*** This means that a near-landless status makes involvement in land conflict less likely, contrary to what has been thought. One reason could be that it is more attractive to grab a bigger size of land rather than a small parcel. In addition, the small plot of land could be a marginally productive land at the edge of a farming area. Hence, it is less likely to get into conflict. The increasing number of landless people, who are primarily female household heads, suggests that policymakers need to seek other approaches in preventing a growing landless population, other than preventing land conflict. Landless and near-landless population reached more than 20 percent in 2004 and rose to 40 percent in 2009 based on Cambodia national data (Oxfam 2015). This finding does not alter the policy intervention needed for near-landless in poverty alleviation efforts. A near-landless household has a farm that is less than 0.5 ha. In all of development literature, it is believed that too small farm size (e.g., <0.5 ha) will not enhance household income to go above the poverty line.

***A female-headed household is not a significant factor or determinant of involvement in land disputes.*** This evidence is contrary to what has been observed in other countries, particularly in the case of Uganda (Castagnini and Deininger 2006). It is possible that the non-vulnerable position of women in a land conflict could be due to the Land Law revision passed in 1999, which recognized women's claims to their land asset. However, a more careful study is required to assess the impact of the Land Law revision on female-headed households and on land conflict.

***The age of the household head positively impacts on likelihood of getting into land conflict for Model A and Model C (i.e., female-headed household).*** Model A shows that for one year, household head's age will increase the odds of getting into a land conflict by about

63 percent.[7] This is contrary to Castagnini and Deininger's (2006) findings in Cambodia. Since land reform recently happened in Cambodia, perhaps the younger generation could benefit more from the titling programs compared to the older generations.

***Chamkar land does not significantly reduce the probability of getting into conflict.*** In Cambodia, *chamkar* land is usually planted to perennial trees such as nuts and/or fruit trees but not rice (World Bank 2006), and is mostly located near houses. In contrast, the dry season land type increases the probability of the plot getting into conflict. Nevertheless, our results show that *chamkar* and dry season land types are not significant factors influencing land conflict.

***Land acquisition modes do not determine the probability of land conflict.*** Although this finding is contrary to what has been found on a different context of an African country, the result is an interesting case for Cambodia (Castagnini and Deininger 2006). It was found that an additional year of land ownership decreases the odds of getting into conflict by 22 percent, while controlling all other variables. The length of ownership mitigates land disputes, and traditional land management relying on informal written paper is still important and recognized. Besides the attempt to recognize traditional land management in the legal system, government must acknowledge and strengthen any existing traditional land tenure.

***The possession of a title lessens the possibility of land conflict.*** In the case of Cambodia, where land right security is still premature, land title as a formal written proof of ownership appears to decrease the odds of getting into conflict by 44.7 percent. This figure indicates the importance of undertaking a more comprehensive and systematic titling program in order to uplift land right security so that all Cambodians will be able to benefit most from their land use.

***Land located in rural areas affects land conflict negatively.*** Instead of having higher probability of conflict in the rural areas due to lack of land right security, it is surprisingly much higher in urban areas. One reason could be the pressure that urbanization has created on increasing land scarcity and on land competition in urban areas. The United Nations database of urbanization describes the relatively rapid urbanization rate in Cambodia in the last 10 years prior to the survey in 2004 (United Nations 2004). Urbanization is a consequence of converting farming land into residences. Thus, urban areas have higher probability of land being in conflict. In other words, land in rural areas would have less odds of being in conflict by 80 percent.

**Productivity Impact of Land Conflict**

Table 4 shows land conflict impact on farm productivity. The analysis provides evidence of negative impact of land conflicts on farm productivity, supporting the hypothesis. Land conflict impacts negatively on farm productivity by 12.8 (logarithmic scale) due to downward spiral events of conflicts. This finding reiterates the urgency to resolve land conflicts or improve land governance in Cambodia not only for agricultural development, but also for Cambodians to have rights over their lands.

7 63% = (exp (0.494) – 1)% whereas 0.494 is regression parameter in Model A.

**Table 3. The determinants of land conflict**

| Conflict | Model A | Sig | Model B | Sig | Model C | Sig |
|---|---|---|---|---|---|---|
| Female (dummy) | 0.040 | | 0.005 | | 0.077 | |
| | (0.230) | | (0.030) | | (0.440) | |
| Age of household head (log years) | 0.494 | ** | 0.382 | | 0.495 | * |
| | (2.020) | | (1.470) | | (1.920) | |
| Near landless (dummy) | - | | -0.488 | *** | -0.480 | *** |
| | | | (-3.530) | | (-3.510) | |
| Length of land ownership (log years) | -0.030 | | -0.202 | * | -0.033 | *** |
| | (-3.250) | | (-1.960) | | (-3.280) | |
| Title (dummy) | -0.341 | | -0.341 | | -0.310 | |
| | (-1.960) | * | (-1.900) | * | (-1.760) | |
| *Chamkar* land (dummy) | 0.042 | | 0.115 | | 0.162 | |
| | (0.160) | | (0.430) | | (0.620) | |
| Dry land (dummy) | 0.121 | | 0.163 | | 0.129 | |
| | (0.610) | | (0.820) | | (0.650) | |
| Rural (dummy) | -0.550 | ** | -0.544 | ** | -0.513 | ** |
| | (-2.630) | | (-2.580) | | (-2.440) | |
| Modality of acquisition | | | | | | |
| Purchased (dummy) | - | | -0.174 | | -0.234 | |
| given_state | | | (-0.790) | | (-1.070) | |
| Given by the state (dummy) | - | | -0.111 | | -0.011 | |
| | | | (-0.670) | | (-0.070) | |
| _cons | -5.531 | *** | -4.420 | *** | -5.225 | *** |
| | (-4.860) | | (-3.800) | | (-4.400) | |
| N (number of observations) | 15216 | | 15027 | | 15215 | |
| Pseudo R2 | 0.009 | | 0.013 | | 0.015 | |

Notes: models A and C: female-headed household, B: female-headed household and widow, ( ) is z-values

***: significant at 1 percent, ** significant at 5 percent, * significant at 10 percent

The analysis also shows that irrigation, fertilizer input, investment on plot, and non-agricultural income (as proxy of household's wealth) impact on farm productivity. On the contrary, ownership of buffaloes has negative productivity effect. Households with more buffaloes possibly engage less in farming but more on livestock raising.

On the other hand, the number of cattle have output-enhancing effect on land productivity. This is similar to the case of Uganda (Castagnini and Deininger 2006). It is common for people in villages to use cattle in ploughing their lands before cultivating it to improve soil fertility. However, ownership of more than two buffaloes negatively impacts farm productivity. In Cambodia, a household raising buffaloes will have less involvement in farming.

As supported by numerous literatures (Bhalla and Roy 1988; Deininger 2003), an inverse relationship between farm size and land productivity is found in this study. For an additional hectare of land, the farm output will decrease by -0.046 percent (both output and land size are in logarithmic scale). This implies that increasing farm size for near-landless, where too small land is not cost productive, is well supported to allow agricultural income increment for rural people in Cambodia (World Bank 2006).

**Table 4. Two-stage least square estimates of the impact of land conflict on farm productivity**

| | Estimates | Std. Err. | t value | Sig. |
|---|---|---|---|---|
| Fertilizer input (log kg) | 0.003 | 0.003 | 11.66 | *** |
| Age of HH head (log years) | 0.103 | 0.03 | 3.42 | *** |
| Non-agricultural Income (log USD) | 0.054 | 0.013 | 4.24 | *** |
| Number of buffaloes (units) | -0.065 | 0.017 | -3.81 | *** |
| Number of cattle (units) | 0.015 | 0.008 | 1.85 | * |
| Had invested on land (dummy) | 0.117 | 0.0567 | 2.06 | ** |
| Rice planted on the plot (dummy) | -0.338 | 0.079 | -4.81 | *** |
| Perennial planted on the plot (dummy) | -0.292 | 0.099 | -2.94 | *** |
| Irrigated in dry season (dummy) | 0.277 | 0.04 | 6.95 | *** |
| Plot size (log ha) | -0.047 | 0.008 | -6.06 | *** |
| Conflict (from equation (3)) | -12.173 | 2.823 | -4.31 | *** |
| Constant | 12.816 | 0.186 | 68.78 | *** |
| No. of observations | 2680 | | | |
| R2 | 0.082 | | | |

Note: *** significant at 1 percent; ** significant at 5 percent; * significant at 10 percent

## CONCLUSION AND POLICY IMPLICATIONS

Results of the study do not support the hypothesis that female-headed households are vulnerable to land conflicts. This could be due to the revised Land Law of 1999, which incorporated women's access to land rights. However, there is a need to further analyze the impact of the revision of the law on women's position in accessing their land and their exposure to land conflicts.

Plots in urban areas are more likely to get into conflict. One possible explanation could be that households or land owners in urban areas face higher land competition because of the pressure of urbanization. More people living in urban areas will result to decreasing land area for cultivation. Moreover, the trend of wealthy people grabbing land by bribing government officers to release fake land titles most probably happens in cities. This could give insight to policymakers in crafting development plans in urban areas where land-related conflicts are prevalent, without impairing agricultural productivity.

This study affirms the negative impact of conflict on land productivity. The NGO Forum on Cambodia in 2005 strongly stated that agricultural lands are mostly involved in disputes in Cambodia. It concluded that community livelihoods are at risk, as agricultural lands are most likely the type of lands to be in dispute (The NGO Forum on Cambodia 2011).

The 2005 sub-decree of state land management declares that state land must have been mapped, and the information entered into a central database that is accessible to the public. Availability of this information could strengthen the recognition of a private individual's or community's ownership over lands and would help avoid land grabbing. However, this is not being implemented systematically or transparently in Cambodia. In addition, if land is left fallow, it is automatically reverted to the state. In rural Cambodia, what comprises "unused" lands are those usually used for crop rotation or cattle grazing and for bequeathing to the children upon marriage (Schneider 2011).

The numerous incidents of land grabbing in Cambodia may lead to land conflicts, which

could be a significant hindrance to poverty reduction. There is urgent call for the Cambodian government to solve land conflicts or improve land governance not only for agricultural development, but also for Cambodians' rights over their lands. The impetus of resolving land issues, especially in rural Cambodia, will contribute to more effective poverty reduction efforts.

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