ISSN 1560-7607 / ISBN 978-99950-52-05-8

CAMBODIA DEVELOPMENT REVIEW

A publication of CDRI—Cambodia's leading independent development policy research institute

VOLUME 20, ISSUE 1 MARCH 2016 $4.00

ON SYSTEMATIC LAND TITLING IN RURAL CAMBODIA: ITS IMPACT ON RICE YIELD AND CROP REVENUE

Introduction

Agriculture is the traditional mainstay of Cambodia's economy as the vast majority of its population live in the countryside. Land remains central to the livelihoods of rural people, not simply as a source of physical security and economic subsistence but also as an important means of wealth accumulation (Deininger and Binswanger 1999).

Until 2001 only 10 percent of the land in the whole country had a title. Thus, in 2002, the Cambodian government embarked on a new systematic land titling program with support from development partners such as the World Bank and Asian Development Bank, and various countries including Germany, Finland, Sweden, Denmark, Japan and South Korea (Thomson 2010). The objective of this ongoing land titling effort is to provide increased land tenure security nationwide and stimulate the rural land market (Sar 2010). The new land program has also simplified land registration proceedings for landowners.

It is important to understand how the implementation of large-scale formalisation of land tenure is affecting agricultural productivity in rural areas. Yet, some 15 years later, the topic remains seriously underresearched. The objective of this study therefore is to investigate the impact of the land titling program in rural Cambodia. An overview of the historical patterns of land tenure in Cambodia and a short literature review on land tenure and titling provide some of the background and motivation for this study. A summary of the key findings and discussion of the effects of the titling program on agricultural outcomes follows. The final section concludes.

Secure land tenure matters for loan collateral, business, housing, rice yield and crop revenue. Kandal, May 2015

In this Issue

Drawing on Sry (2013), this article was written by Sry Bopharath, research associate, Economics Unit, CDRI. Full citation: Sry Bopharath. 2016. "On Systematic Land Titling in Rural Cambodia: Its Impact on Rice Yield and Crop Revenue." *Cambodia Development Review* 20(1): 1-7. Phnom Penh: CDRI.

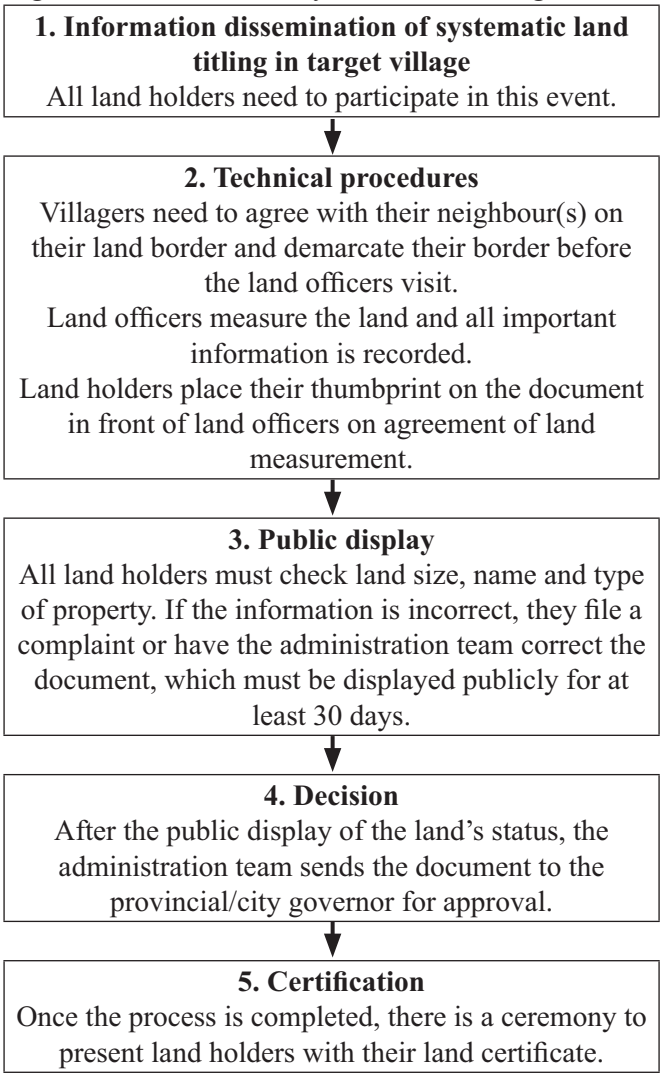
History of land ownership

Prior to French colonisation, common people could practically possess, inherit, sell and cultivate land; however, all land belonged to the King and there was no formal registration of private land rights. Towards the end of the 19th century, the French began institutionalising land ownership to reduce the power of the royal court and generate tax revenues (Chandler 2008,174). Although the Land Law was introduced in 1884, it was not put into practice until the 1930s when most rice fields were registered as private property and landholders could sell their land in their own right.

This system of land registration continued after independence until 1975. The 1962 national census recorded 800,000 agricultural plots, 84 percent of which were privately owned (Sar 2010). Under the ultra-collectivism promoted by the Khmer Rouge from 1975 to 1979 (Frings 1994), the private ownership of land was abolished and most land documentation destroyed (Hap 2010). The substitution of the collective for private ownership was short-lived, however. The need for economic liberalisation became increasingly clear, leading to the reinstitution in 1989 of private property rights (Gottesman 2004). This was followed in 1992 by reform of the 1884 Land Law. Importantly, the reform provided neither an effective land management system nor comprehensive information about individual ownership. Despite the establishment of a new democratic regime in 1993, there was no further significant legal land reform until 2001, when an amendment to the Land Law was passed. According to HE Senior Minister Chea Sophara, Ministry of Land Management, Urban Planning and Construction (VOA 2016), to date, 4 million (57 percent) of a total 7 million land parcels in Cambodia have been registered.

The 2001 ammendment to the Land Law classified land ownership into three types: state, private and collective. State land includes all lands that have not been privately allocated. There are two types of state land: state public land (for public benefit) and state private property (owned by the state). State public land is used for public interest and includes lakes, rivers, forests, designated nature reserves, archaeological, cultural and heritage sites, and public buildings such as hospitals, schools and administration buildings. State private property, on the other hand, can be sold, transferred or leased, and can be subject to other legal contractual transactions such as economic land concessions and social land concessions for up to 99 years (Cambodian Center for Human Rights 2013). Private property can be used for crop production or personal residence, and can involve individual or joint ownership. Collective land consists of monastery property and the property of indigenous communities that "reside in the territory of the Kingdom of Cambodia whose members manifest ethnic, social, cultural and economic unity and who practice a traditional lifestyle, and who cultivate the lands in their possession according to customary rules of collective use", according to Land Law, Article 23 (CDC, CIB and CSEZB 2016).

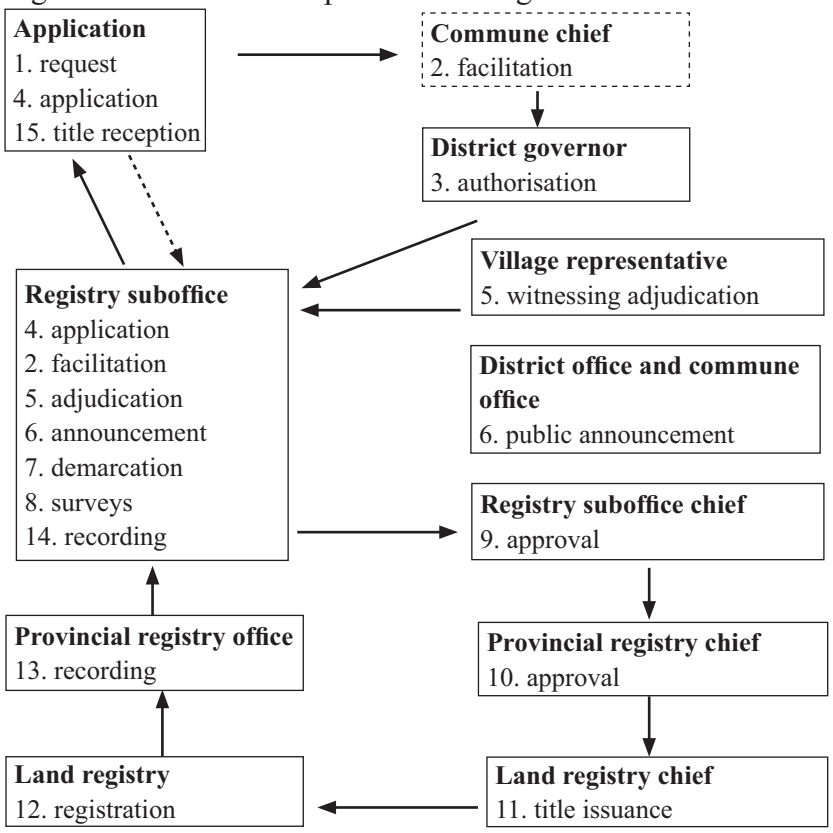
Figure 1: Procedure of systematic land registration



Source: MLMUPC 2013

There are two types of land registration in Cambodia: systematic and sporadic. Systematic land registration is implemented village-by-village

Figure 2: Procedure for sporadic land registration



Source: Torhonen 2001

and within a certain timeframe, while sporadic land registration allows individuals to apply for a land title at any time. Systematic land registration is initiated by government, while sporadic registration is at the request of individual landowners.

Literature review

Neoclassical economic theory states that a piece of land without formal legal recognition is like "dead capital" (Soto 2000). To change this dead capital into live capital, land owned by individuals should be titled. Soto (2000) puts forward three main arguments for the issuance of legal land titles to the poor. First, people need to feel that they have secure tenure on their land so they can invest in their business and housing. Second, legal land tenure turns land into a liquid asset that can be used as loan collateral. Third, through systematic land titling, the provision of individual freehold titles can enable developing countries to move out of poverty. As a result many countries have implemented land titling programs. Some empirical works find that systematic land titling increases agricultural output, investment and credit use; however, other studies find no effects at all, or mixed results at best.

For instance, using a difference-in-differences method to evaluate Peru's systematic land titling program implemented in 1994-2000, Fort (2007) finds a positive effect on individual investment. Similarly, Deininger and Jin (2006) demonstrate the positive effect of land tenure on investment in Ethiopia. In Vietnam, Do and Iyer (2008) find that land reform through systematic land registration has a statistically significant impact on households' decisions to make long-term investments in agriculture.

By contrast, Borrows and Roth (1990) find no significant differences in investment and productivity between titled and non-titled plots in Kenya, Uganda and Zimbabwe. They contend that the supply and demand for investment is low due to market imperfections, and that potential investments are held back by a lack of institutional rules to protect individuals' rights to the access and use of their property.

The literature provides some evidence for the positive impacts of legal land title on investment. A study by Markus and Udry (2008) in Ghana finds that secure land tenure affects land investment and land fertility. In Brazil, the possession of a formal title is associated with increased investment in land and growth in land values (Alston, Libecap and Schneider 1996). Galiani and Schargrodsky (2010) show how urban land titles encourage more housing investment. And Markussen's (2008) research in Cambodia demonstrates that property rights have a positive and statistically significant effect on agricultural productivity and land prices.

Methodology

Data and descriptive statistics

I use data from Cambodia Socio-Economic Surveys 2004 and 2008, and information from the Ministry of Land Management, Urban Planning and Construction and the General Department of Cadastre and Geography on systematic land registration in 338 villages between 2004 and 2008.

The treatment group comprises villages where land titles were issued between 2005 and 2007, and the control group consists of villages that

were not covered by the land titling program. After ensuring balance in the baseline characteristics of both groups, there are 14 treatment villages (129 households) and 148 control villages (1775 households). Around 80 percent of households have a male household head, and average household head age is around 46 years. The dependency ratio of around 78 percent is quite high. Households own on average 0.6 ha of agricultural land most of which is wetland, and attain an average rice yield of 1.6 t/ha (Table A1).

Modelling agricultural productivity and income impacts

To determine the impacts of the land titling program on farm households' agricultural productivity and income, I perform ordinary least squares regression as expressed in the following form:

$$log y_{hvt} = \alpha + \gamma treatment_v + \tau year2008_t + \delta(treatment_v * year2008_t) + \beta X_{hvt} + \varepsilon_{hvt}$$

where y_{hvt} is the outcome variable of interest such as rice yield or crop revenue in each individual household h and village v at time t; $treatment_v$ is a dummy variable for treatment villages; $year2008_t$ is the year dummy; $treatment_v * year2008_t$ is the dummy variable for interactions between treatment and year; δ is the coefficient of interest which captures the impact of the land titling program; X_{hvt} are other control variables; and ε_{hvt} are error terms.

Following Angrist and Pischke (2009), the key assumption in the difference-in-differences evaluation method is:

$$E[Y_{0hvt}|v,t] = \gamma_v + \tau_t$$

where v denotes treatment village (1 for treatment, 0 otherwise) and t denotes time (2004 before the program, 2008 after the program). The key identifying assumption is that in the absence of titling, or at the beginning of the program, trends in agricultural productivity would have been the same in treatment and control villages.

In the regression, plot characteristics include land type and irrigated plot dummy, and village characteristics capture both government and NGO-run village-level development projects and government technical support for crop production, livelihoods and fisheries. Household characteristics include household head age, gender and literacy, household size and dependency ratio, loan type and plot size. Because the data is pooled cross-sectional data for two years, to control for any variation between provinces and across time, I add to the equation two variables: province fixed effects, and province fixed effects multiplied by time fixed effects. Standard errors are also clustered at village level.

Empirical results

An important potential effect of the systematic land titling program is increased agricultural productivity. Table A2 presents the estimation of the village-level effects of the program on rice output and crop revenue.

First, to examine effects on rice productivity, I model the change in output at plot level. Rice productivity in the treatment villages is 65 percent lower than in the control villages; the difference is statistically significant at the 10 percent level (column 1). However, when controlled for village fixed effect, which is a richer specification, the impact in treatment villages is very weak and the result is not statistically significant (column 4). Second, the percentage change in crop revenue in the treatment villages is 2.8 percent (column 5), but 1.9 percent (column 8) when controlled for village fixed effect; the difference is not statistically significant, however.

The results provide no evidence that the land titling program has significant positive effects on rice yield and crop revenue. Thus, the systematic land titling program shows no statistically significant effect on agricultural output.

Conclusion

Contrary to much of the literature, the study findings do not support the hypothesis that systematic land titling has positive impacts on agricultural output at plot level. The contribution of the national land titling program to agricultural productivity growth in Cambodia so far appears to have been negligible.

Taken at face value, not achieving the expected outcomes is perhaps disappointing. However, Cambodia's experience is not dissimilar to that of Kenya, Uganda and Zimbabwe, where land reforms were also found to have little impact on agricultural production (Borrows and Roth 1990). Importantly,

care must be taken to not let complacency set in. Although the program has been ongoing since 2002, the issuance of formal rural land titles remains limited. This calls for accelerated land titling, with a special focus on vulnerable rural households, particularly smallholders, to both broaden land ownership and reinforce the benefits of secure land tenure.

On a final note, the relationship between land tenure and agricultural growth is a new area of research in Cambodia and research-supported knowledge is limited. Future research efforts might merit a cross-sectional study over an extended timeline.

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Appendix

Table A1: Descriptive key variables, 2004 and 2008

Control group variables					2004 & 2008
	Mean	SD	Min	Max	N
Sex of household head (1=male)	0.81	0.40	-	-	2638
Age of household head (years)	46.19	13.98	19	88	2638
Household head can read and write (%)	0.69	0.47	-	-	2638
Household size (persons)	4.95	1.96	1	14	2638
Dependency ratio (%)	0.78	0.69	0	5	2611
Formal loan per household (USD)	0.12	0.32	-	-	2638
Informal loan per household (USD)	0.28	0.44	-	-	2638
Area of plot (ha)	0.70	0.91	0.001	15	5221
Rice production (t/ha)	1.74	1.08	0	5	3051
Revenue (USD/ha)	388.70	498.01	0	8981.35	5145
Types of land (ha)					
Wetland	0.48	0.50	-	-	5221
Dryland	0.15	0.35	-	-	5221
Both wet and dryland	0.04	0.19	-	-	5221
Chamkar	0.24	0.42	-	-	5221
Kitchen garden	0.03	0.17	-	-	5221
Other	0.08	0.26	-	-	5221
Irrigated plot (ha)	0.45	0.49	-	-	5221
Village projects (% of total)					
Gov: agricultural development	0.10	0.30	-	-	293
Gov: infrastructure development	0.23	0.42	-	-	293
Gov: water development	0.09	0.28	-	-	293
NGO: agricultural development	0.14	0.34	-	-	293
NGO: infrastructure development	0.11	0.30	-	-	293
NGO: water development	0.08	0.28	-	-	293
Gov: technical support for crops, livestock or fisheries	0.10	0.20	-	-	293
Treatment group variables					2004 & 2008
	Mean	SD	Min	Max	N
Sex of household head (1=male)	0.80	0.41	-	-	197
Age of household head (years)	45.36	14.45	21	85	197
Household head can read and write (%)	0.78	0.42			197
Household size (persons)	4.77	1.73	1	12	197
Dependency ratio (%)	0.79	0.69	0	4	194
Formal loan per household (USD)	0.19	0.39	-	-	197
Informal loan per household (USD)	0.26	0.44	-	-	197
Area of plot (ha)	0.55	1.28	0.003	16	411
Rice production (t/ha)	1.52	0.71	0	5	242
Revenue (USD/ha)	370.33	504.77	0	6150.06	381
Types of land (ha)					
Wetland	0.60	0.48	-	-	411
Dryland	0.07	0.25	-	-	411
Both wet and dryland	0.03	0.16	-	-	411
Chamkar	0.11	0.31	-	-	411
Kitchen garden	0.01	0.11	-	-	411
Other	0.20	0.37	-	-	411
Irrigated plot (ha)	0.32	0.47	-	-	411
Village projects (% of total)					
Gov: agricultural development	0.15	0.36	-	-	27
Gov: infrastructure development	0.34	0.49	-	-	27
Gov: water	0.11	0.33	-	-	27
NGO: agricultural development	0.22	0.44	-	-	27
NGO: infrastructure development	0.11	0.33	-	-	27
NGO: water	0.19	0.40	-	-	27
Gov: technical support for crops, livestock or fisheries	0.18	0.25	-	-	27

Note: 1 dollar=4065 riels in 2008; consumer price index in 2004=81 and in 2008=166 (index reference period 2006=100).

Table A2: Results of ordinary least squares regression for rice output and crop revenue

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	Rice output per hectare				Crop revenue per hectare			
Title	-0.0481	-0.133	0.0292	---	0.0255	-0.0170	0.207*	---
	(0.160)	(0.125)	(0.106)	---	(0.145)	(0.162)	(0.123)	---
Year 2008	0.157**	0.191*	0.190	0.265**	0.459***	0.578***	0.417**	0.601***
	(0.0738)	(0.112)	(0.168)	(0.122)	(0.0672)	(0.200)	(0.205)	(0.162)
Interaction: treatment and year 2008	**-0.651***	**-0.251**	**-0.0612**	**0.0086**	**0.0278**	**0.0495**	**0.0045**	**-0.0192**
	(0.377)	**(0.265)**	**(0.176)**	**(0.104)**	**(0.167)**	**(0.188)**	**(0.159)**	**(0.126)**
Constant	-0.275***	0.384***	-2.227	-0.988	13.68***	13.31***	14.52**	14.39***
	(0.0701)	(0.100)	(3.979)	(3.513)	(0.0603)	(0.132)	(6.209)	(4.317)
Observations	3,227	3,227	3,198	3,198	5,052	5,052	4,997	4,997
R-squared	0.015	0.080	0.593	0.676	0.039	0.110	0.211	0.348
Province fixed effects	no	yes	yes	no	no	yes	yes	no
Province time fixed effects	no	yes	yes	yes	no	yes	yes	yes
Village fixed effects	no	no	no	yes	no	no	no	yes
Control for village characteristics	no	no	yes	no	no	no	yes	no
Control for plot and household characteristics	no	no	yes	yes	no	no	yes	yes

Note: Robust standard errors (in parentheses) are adjusted for village clustering in columns 1, 2, 3, 5, 6 and 7 and household clustering in columns 4 and 8.
Statistically significant at the *10%, ** 5% and *** 1% level.
Only households who own or operate land for agricultural purposes are included; net revenue per hectare of harvested land is in logarithm form.
Included in the estimation are: type of land; village infrastructure projects; household head characteristics; farmland size; dummy years (2004, 2008); plots that have been cultivated; and year of land title issuance.
The unit of observation is farm plot.