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Cultivate or Rent Out?

Land Security in Rural Thailand

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Abstract

In the 1980s, the Thai government tried to legalize squatters living in certain geographical areas by issuing special titles that allowed for cultivation but restricted the sale and rental of the land. Using data from 2,874 farming households collected in 1997 and a differences-in-differences empirical strategy, we compare the differential rental rates between secured and unsecured plots in reform and non-reform areas. In reform areas, households are more likely to lease secured plots and cultivate unsecured plots. In addition, using land rental rates and prices, we estimate a 6 percent premium due to expropriation risk. In other areas, however, land rights do not influence leasing decisions and no risk premium is found. These results indicate that this property rights reform distorted the land rental market by triggering a sense of insecurity among owners of undocumented land. Since the program targeted more developed areas, our results may underestimate the true negative impact of the reform.

Keywords: Property rights, land titling, development policy, externality.
JEL Codes: P14, Q15, Q23, Q28, O13, O17, O18.

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1 Introduction

It is often argued that well functioning land markets play an important role in economic development by improving the allocation of resources. The extent to which they work, however, is determined by the environment and the specific government policies or institutions in place (World Bank, 2003; de Janvry et al., 2001).

In this paper, we show empirically how a government property rights reform created an unforseen negative externality that distorted the land rental market. In the 1980s, the Thai government tried to legalize squatters living in officially declared forest reserves and other public land by issuing special titles that allowed for cultivation but prohibited the sale and rental of the land. Violations of these restrictions could result in expropriation of the land. Before the reform, landowners were leasing plots of land irrespective of whether or not they had a legal deed. We claim that by enforcing the restrictions in these reform titles, the government managed to scare neighboring owners of undocumented land. Suddenly, these owners now feared that undocumented land would also be expropriated if leased, despite the restrictions only applied to reform titles. Supporting this claim, we find that in areas where this reform took place, leased plots are significantly more likely to be secured with full ownership titles than elsewhere. In addition, the rental rate of unsecured plots in reform areas include a risk of expropriation premium.

Although the specific example is from Thailand, the findings are important because they shed light into the relevance of the timing and the design of property rights reforms.

The literature on formal land titling formalized in Besley (1995), has typically found large private benefits in measures, such as investment on the land (Banerjee et al., 2002; Galiani and Schargrodsky, 2004), access to credit (Feder et al., 1988a; Do and Iyer, 2004) and labor supply (Field, 2003). The policy we study, not only resulted in small private benefits (Feder et al., 1988b) but it actually created large social costs by distorting the land rental market. In this sense, this paper contributes to the literature of the efficiency of land markets (Baland et al., 2000; Macours, 2003; Deininger and Jin, 2003; Goldstein and Udry, 2004).

The results suggests that the introduction of formal partial rights may do more harm than good, and that instead, full ownership rights should have been issued.

The data used in the paper come from a cross-section survey conducted in 1997 in two

provinces of the Central region and two in the Northeast region of Thailand. The sample design was special in that villages inside and outside officially declared forest reserve were surveyed. In addition, reform titles were issued in some villages but not others. Thus, survey villages fall into one of four bins depending on whether or not they are forest and program (reform) villages.[1] Depending on the village, plots can have full ownership titles, program titles or can have either less secure titles or no document at all.

Program placement was not random as it targeted more developed villages. As stated in the Thai Forestry Sector Master Plan (1993, pp.64) the program was seen as the first step towards the future privatization of the land, although this privatization never materialized. Therefore, program titles were issued in villages located in areas that were supposedly more suitable for agriculture and that would never revert back to forest reserve. If we believe that more developed villages have better functioning land markets, then our results would underestimate the true negative impact of the reform.

The econometric identification uses a differences-in-differences approach by comparing across village bins whether a plot security affects the probability of being leased. We control for unobserved heterogeneity at the household level by using household fixed effects, following Shaban (1987) and Jacoby and Mansuri (2003, 2004). This approach allows us to make a clear case for the fear of expropriation driving the observed behavior in the land market. While it is usually difficult to control for unobserved land quality, even with household fixed effects, any story about unobserved land quality fails to rationalize why one would expect land rights to matter in program areas but not elsewhere.

The paper develops a stylized dynamic general equilibrium model which shows how, in the presence of expropriation risk, mostly –if not only– titled (i.e. secured) land is leased. In this context, only titled land is leased if it alone suffices to equate all the agents' marginal productivity. In this case, the Pareto optimum is achieved. However, if there is too little titled land, then the equilibrium is such that some untitled land –unsecured and thus subject to expropriation– is leased and landowners and tenants cultivate at different productivity levels. In this case, the expropriation risk results in a welfare loss.

In the alternative case of no expropriation risk, land rights do not predict what plots

[1] Throughout the paper we denote as forest villages those villages inside or adjacent to officially declared forest reserves. Likewise, a program village is defined as a village where the government agencies that implemented the reform issued special titles.

are leased and the Pareto optimum is always achieved. The findings thus confirm the predictions of the model.

In addition, we derive the equilibrium pricing equations for both titled and untitled land. Using data from the asking price of the plot and its rental price, we estimate a probability of expropriation of 6 percent in program and forest villages, precisely where the reform titles were enforced. The fear of expropriation created a wedge between the marginal productivity of households that lease in and those that lease out, evidencing that the reform distorted the land market.

The rest of the paper is organized as follows. Section 2 provides background information about land rights and tenancy in Thailand. Section 3 presents the model in greater detail. In Section 4 we describe the data used in the analysis. Section 5 presents the econometric specifications to be estimated and Section 6 the regression results. Finally, Section 7 concludes.

2 Background

Historically, all land in the Kingdom of Thailand belonged to the King. Throughout most of its history, population density was low and thus increases of agricultural output were obtained by expanding into forests and clearing them. Little concern was given to formal ownership registration and the government did little to interfere. The opening of the country to international trade and population growth brought significant incentives for production expansion, and pressures for a more secure form of land ownership (Feeny, 1982). In 1872 King Chulongkorn introduced procedures for the recognition of private rights in land. Title documents for the rice land were established in the main rice producing areas. Several modifications were enacted over the years culminating in the Land Code of 1954, which is still in effect today.

Nowadays, land is classified into **private land**, extending over 19 million hectares in 1994 (40 percent of total land), and **public or government land**. Government land covers 23 million hectares, including national parks, wildlife sanctuaries and land reform areas.[2] As mentioned in the introduction, some of the forest areas have been squatted. In

[2]The land reform started in 1975 and that will be covered in greater detain in Subsection 2.3.

1993, only 13 million hectares had forest cover as the rest had been degraded or converted into farmland (Chirapanda, 2000).

We now describe in greater detail land ownership in private land, forest reserve areas and land reform areas.

2.1 Private Land: The Land Code of 1954

The Land Code of 1954 contains procedures for the issuance of documents recognizing title to land in non-forest areas and the maintenance of the land register. It defines different types of documents depending on whether the owner can claim occupancy, utilization or legal possession of the land. The most valuable document is the NS-4 (chanod), a full unrestricted legal title. This document enables the owner to sell, transfer and legally mortgage the land.

The documents related to land utilization are NS-3 and NS-3K, "Certificate of Use" and "Exploitation Testimonial" respectively. These documents certify that the occupant has made use of the land for a prescribed period of time. Both the NS-3 and NS-3K enable legal transfer by sale or will, and in this sense are similar to the NS-4.[3] According to Williamson (1983) and the Ministry of Agriculture and Cooperatives, banks will lend equally irrespective of whether the land has a title or a certificate of utilization.[4]

Although NS-4, NS-3 and NS-3K are the only documents allowing the owner to transact freely and legally, there are other documents defined in the Code that support ownership. The NS-2 document is a "Preemptive Certificate" which authorizes temporary occupation of land. It does not allow legal transfer of land except by inheritance and therefore it is not used as collateral. Finally, there exists the "Claim Certificate" SK-1, which was issued during the implementation of the Code.

Still in the 1980s, the majority of the labor force in Thailand was employed in agriculture. Low real incomes in rural areas and widespread poverty motivated further land

[3]The difference between NS-3 and NS-3K documents lies in the mapping system used. NS-3 certificates were granted between 1954 and 1972, and were mapped in isolation by tape surveys. The land was described in the certificate by metes and bounds with an approximate diagram showing the shape of the parcel. After 1972, systematic surveys using unrectified aerial photographs were introduced (NS-3K), where land is described on the certificate by a deed plan.

[4]Using the Townsend-Thai dataset, Giné (2005) also finds that land plots with either NS-3, NS-3K or NS-4 documents are used indistinctively as collateral in loans from formal institutions.

settlement. The Department of Lands (DOL) was hard-pressed to meet the demand for land records, but as Rattanabirabongse et al. (1998) suggest, with the resources and procedures available at that time, it would take 200 years to distribute title deeds to all eligible land holders.

Therefore, in 1984, the Thai government started the implementation of a World Bank funded project aiming to strengthen the capacity of the DOL to perform land surveying, registration and documentation. The main objective of the Land Titling Program (LTP) was to systematically award title documents (NS-4) to eligible landowners who had no documents or possessed preliminary documents (NS-2, SK-1) and the conversion of utilization certificates (NS-3, NS-3K) held by many landowners to titles.

Systematic registration under the LTP was undertaken on the basis of whole subdistricts. A team of surveyors would go into the field and, with the Village Head, would have land occupiers, in the presence of people with rights in adjoining land, indicating the positions of the boundary corners.[5] The documents provided by the land holder[6] and the plot measurements would be given to the adjudicator who after revisions and checks with the cadastral maps would approve the issuance of the title.[7]

While the cost of the systematic land titling activity was largely underwritten by the government, fees for sporadic issuance of title were charged on the basis of full recovery of costs.[8] Under the systematic registration land holders were only charged a nominal amount for the cost of corner marks - 110 baht/title (about US$2.55).

Since the cost of registering a plot was so low, one is left wondering why not all plots were registered. The answer lies in what constitutes forest reserve. Since the Land Code regulates private land only, all titles issued under the LTP had to be located in non-forest areas.

[5]There were procedures in place if disputes were to arise, however, under the LTP very few disputes that could not be settled in the field took place and few if any appeals were made to the court system.

[6]These documents include personal identity and family history information and one piece of evidence of ownership: preemptive certificates (NS-2) and proof of use, NS3 or NS3K certificates if applying for a title, SK-1 or land tax receipts (PBT certificates).

[7]If the landowner possessed an NS-3K document, there was an automatic conversion procedure by overlaying the unrectified map with the rectified photomap. A judgment was then made on whether a title could be produced from the NS-3K certificate, and in some cases a field inspection was undertaken.

[8]Sporadic registration takes place when the land holder, out of the his or her own initiative makes an application to the land office. This application can only be accepted where there is an existing cadastral map.

The LTP evolved in four different phases, and although the last phase was scheduled to finish in October 2004, all the provinces in the Townsend-Thai dataset had been covered by the LTP at the time of the survey.

Table 1 reports data from Buriram province, the only province present in the Townsend-Thai data set (post LTP) and in the survey by Feder et al. (1987, 1988a, 1988b) before the implementation of the LTP. Table 1 provides evidence of the success of the LTP.[9] While Feder et al. (1988a) report that only 12 percent of legally owned land is covered by full title (NS-4), the Townsend-Thai data report a 43 percent of titles in roughly comparable regions. There is also clear evidence of the conversion from NS-3, NS-3K certificates or other documents to NS-4. However, about 45 percent of all plots still were not covered by a NS-4 or NS-3, NS-3K title even after the implementation of the LTP. As mentioned before, some of these plots were located in either officially declared forest reserve areas or in land reform areas.

2.2 Public Land: Forest Reserve Areas

About 60 percent of all public land is forest land. It is administered by the Royal Forest Department (RFD) but like many other developing countries, Thailand has faced the illegal occupation and use of state-owned land by a large number of farmers.

Feeny (1984) estimates that forest reserve coverage dropped from 70 percent at the turn of the century to less than 30 percent in the mid 1980s. In 1961 the Thai Cabinet set a policy that 50 percent of the country be reserved for forestry. In 1964 the National Forest Reserve Act was passed, designating various areas within Thailand as gazetted forest reserves and detailing limitations to their exploitation.[10] Agricultural cultivation within those areas was specifically prohibited. The declaration of a new forest reserve area also changed over time. Under the previous law of 1938, government officials had to check the area to be declared and consulted with village heads. The complexity of

[9] See Rattanabirabongse et al. (1998) and Heath (1999) for a more detailed explanation of the Land Titling Project.

[10] Other legislation that gives RFD jurisdiction over forest land include the National Park Act of 1961, the Wildlife Conservation and Protection of 1992 and the Cabinet Resolution on Watershed Classification.

these discussions may explain the slow progress made in forest demarcation while the law was effective (Vandergeest, 1995; Wittayapak, 1996 and Fujita, 2003). The law of 1964 simplified the procedures for declaring reserve forest by making them less subject to community discussion and consent. There were no public meetings and local village heads were not required to approve the proposed demarcation. In a way, the legal definition of forest changed from land not legally claimed and cultivated to land demarcated on a map as forest reserve.

Despite this new government initiative, in the mid 1980s about a fifth of the land officially designated as forest reserve was permanently occupied and cultivated by squatters. It represented 21 percent of the land under cultivation.

After the law was enacted, the ongoing encroachment and illegal logging can partly be attributed, as Feder et al. (1988a), Vandergeest (1995), Fujita (2003) and others suggest, to little enforcement by forestry officials, the squatters' lack of knowledge about the law and also the lack of clarity in the Act itself. In many instances, it was not until the distribution of NS-3K from 1972 onwards and the LTP that households learned that they could not obtain a full title for certain plots because they were located inside the forest reserve. In addition, areas officially designated as forest reserves did not have carefully delineated boundaries, and in many cases, areas not suited for agricultural purposes were not selected. Likewise, many areas that were designated as forest reserves were already partially or fully settled (Ministry of Agriculture and Cooperatives, 1993). The Act arbitrarily divided forest reserve from private land in identical agro-climatic zones and in areas with similar sociopolitical structures.

In the Townsend-Thai dataset, roughly 60 percent of the villages surveyed fall on the boundary or inside forest reserves, and roughly 20 percent of households have simultaneously plots outside the forest reserve, for which they have full titles, and inside the forest reserve, for which they would be considered illegal squatters. Chirapanda (2000) also reports that some villages' schools and other public amenities were sometimes located inside officially declared forest areas. In these villages, while government agricultural extension agents were helping farmers grow new crops, forestry officials could have arrested them for illegally occupying the land.

This pattern of illegal occupation left the government with little or no option but to legalize squatters. The Department of Land was ready to privatize land and issue title

deeds under the Land Code of 1954, but the RFD was reluctant to give up jurisdiction over demarcated forest reserve.

In the end, the government permitted the RFD to introduce a program in 1981 that would recognize the rights of agricultural land holders inside forests, with a 5-year usufruct licence (STK) that could be renewed if land had been continuously cultivated (Fujita, 2003). This certificate only covered holdings of up to 2.4 hectares but in many areas, as Feder et al. (1988b) report, squatters were not being clearly told the status of their land above the covered limit. These squatters therefore became uncertain about their continued ownership and ability to transfer land. In the Townsend-Thai data set, about a quarter of all plots with an STK license exceeded the limit in size.

Furthermore, this certificate prohibits its conversion into a title deed (NS-4) or certificate of use (NS-3, NS-3K), it restricts transfer of holding to only by inheritance and therefore prohibits the transfer of ownership or rental. More importantly, failure to comply with these conditions could result in revocation of the usufruct rights without compensation. In conjunction with this program, the RFD increased surveillance of parks with the assistance of military and police (Vandergeest, 1995 and Sato, 2000).[11]

As a result, despite villagers initially welcomed the program because it allowed them to register with the RFD, Feder et al (1988b) conclude that uncertainty about their coverage and the explicit threats could have reduced the sense of security acquired by squatters after years of little interference from the authorities.

The STK project ended in 1993 when all the degraded forests were transferred to the Agricultural Land Reform Office (ALRO) for redistribution, under the settlement program to which we now turn.

2.3 Public Land: Land Reform Areas

The Agricultural Land Reform Act of 1975 tried to remedy the high rate of tenancy in certain regions of the country, particularly the North and Central regions, the large number of landless households and the already mentioned encroachment of public lands.

[11]The public support for RFD and the need for conservation and expansion of protected areas was bolstered by two important incidents. First, in 1973, a group of military figures were discovered hunting in a Wildlife Sanctuary with high-caliber weapons and official vehicles. Second, in 1989, mass land slides killed hundreds of people in the South.

The legislation called for the establishment of the Agricultural Land Reform Office (ALRO) in the Ministry of Agriculture and Cooperatives to serve as the implementing agency. The objective of the law can be found in the following excerpt from Section 4 [Italics included]:

> "Redistribution of land for farming and residential uses by allocating state land or, land purchased or expropriated from landowners who *do not themselves cultivate* or who own land in excess of what is stipulated by the Agricultural Land Reform Act of 1975 to farmers who are landless or do not have sufficient land for cultivation, and to farmers' institutions by means of lease and sale."

Thus the land reform law sought to redistribute land to landless households and to provide special title deeds to squatters in public lands. While private land was acquired voluntarily through direct purchase[12], public land came from encroached national forest reserves and other government land. The beneficiaries had the option to either lease or buy from the government at a discount.

During the implementation of the land reform there was a shift in priorities. While in the beginning the main focus was on confronting the high tenancy rates and landlessness in the Central Plains, a few years later, the government realized that the encroachment problems were serious and affected a much wider area across the country. Around 1978, the ALRO thus adjusted its focus from buying land from private hands to allocating public land that was either donated by the King or transferred from the RFD.

Table 2 reports the amount of land and number of beneficiaries declared under Land Reform areas from 1975 to 2003 in previously private and public land. By the time the Townsend-Thai dataset was collected in 1997, all provinces had land reform areas.[13]

Table 2 shows that the bulk of the land allocated comes from public land. As such, the land reform achieved little redistribution because in public areas it only legalized landholders in encroached forests. Most farmers continued to cultivate the same plots

[12] Although the law established the expropriation of land from large and absentee landowners, the political will was so weak that land was never acquired through expropriation.

[13] The land reform program started in 1977 in both Central provinces and a year later in both Northeast provinces.

they long held, although they were not allowed to sell or lease the land. In this sense, the SPK-4.01 was very similar to the STK issued by the RFD. As Fujita (2003) documents, in some places existing STKs were exchanged for SPK-4.01s.

Suthiporn Chirapanda, deputy secretary-general of ALRO from 1982 until 1992, concludes that lack of political will to solve the numerous problems and a major political scandal forcing a change of government resulted in a relatively small program in terms of land allocated and number of beneficiaries.[14]

Despite the program being small, the SPK-4.01 title was issued in roughly half of the villages in the Townsend-Thai dataset. Of these villages, about two-thirds are located inside forest areas, proving that the RFD did surrender land jurisdiction to the ALRO. The rest are villages outside gazetted forests where either private land or other government land was redistributed.

Similar to villages where STK certificates were issued, we argue that the political tension created by the land reform, and the explicit threats if the restrictions were violated, led households in program villages to be reluctant to lease out *other* unsecured plots.

In the following section we develop a model that explores the implications of expropriation risk on the land rental market. In particular, we derive pricing equations for both types of land and testable implications of when each land type will be leased.

3 The Model

Consider an economy populated by N farmers that live infinite periods and have access to a cultivation technology that uses land as the only input. There are, however, two types of land, titled, L^T and untitled L^{NT}. Both types of land are equally productive but unlike titled land that is secured, untitled land can be expropriated by the government with probability ϕ if leased. The technology $f(x)$ is increasing and concave in cultivated land x and satisfies the usual Inada conditions:

$$f(0) = 0, \quad \lim_{x \to 0} f'(x) = \infty, \quad \text{and} \quad \lim_{x \to \infty} f'(x) = 0.$$

[14]The number of beneficiaries as a fraction of total population ranges from 6.5 percent in Sisaket to less than 2 percent in Lopburi.

Farmers are born with an endowment of titled and untitled land. The total stock of titled and untitled land is constant over time. Implicitly, we assume that the government allocates any expropriated land to some other farmer. More formally,

$$\sum_{j=0}^{N} L_{jt}^{NT} = \overline{L^{NT}} \quad \text{and} \quad \sum_{j=1}^{N} L_{jt}^{T} = \overline{L^{T}}, \quad \forall t, \quad \text{where } j \text{ indexes the farmer.}$$

Every period, farmers decide how much land to cultivate and how much land to purchase or sell, for the next period. Although agricultural output is perishable, land is not, and therefore, accumulation of land is the only way to transfer resources from one period to the next. We assume farmers have linear period utility and discount the future at rate β.[15] Let P_t^i, R_t^i for $i = T, NT$ be the price and rental rate of land of type i in period t, respectively, and let x_t^i be the land of type i cultivated in period t. Then the farmer optimization problem can be written as:

$$\begin{aligned}
&\max_{\{c_t\}_{t=0}^{\infty}} E_t \left[\sum_{t=0}^{\infty} \beta^t c_t \right] \\
&\text{s.t.} \quad c_t + P_t^T L_{t+1}^T + P_t^{NT} L_{t+1}^{NT} = \max_{x_t^T, x_t^{NT}} \left\{ f(x_t^T + x_t^{NT}) + (L_t^T - x_t^T) R_t^T \right. \\
&\left. + (L_t^{NT} - x_t^{NT}) R_t^{NT} + P_t^T L_t^T + P_t^{NT} \left[L_t^g + (1 - \Phi_t) L_t^{NT} + \Phi_t \left[(1 - \phi_t) L_t^{NT} + \phi x_t^{NT} \right] \right] \right\},
\end{aligned}$$

where L_t^g is untitled land expropriated by the government and redistributed at the end of period t, and Φ_t is a dummy variable that equals 1 if untitled land is leased, $x_t^{NT} < L_t^{NT}$. The expectation is taken over all possible government allocations of expropriated land. We now define an equilibrium for this economy:

Definition 1 *A competitive equilibrium is a set of initial land endowments* $\left\{ L_{j0}^T, L_{j0}^{NT} \right\}_{j=1}^{N}$, *a government allocation policy* $\left\{ L_{jt}^g \right\}_{t=1}^{\infty}$ *for* $j = 1, .., N$, *sequences* $\left\{ c_{jt}, x_{jt}^T, x_{jt}^{NT} \right\}_{t=1}^{\infty}$, *for* $j = 1, .., N$ *and rental rates and prices* $\left\{ R_t^T, R_t^{NT} \right\}_{t=1}^{\infty}$, $\left\{ P_t^T, P_t^{NT} \right\}_{t=1}^{\infty}$ *such that:*

i) Given rental rates and prices $\left\{ R_t^T, R_t^{NT} \right\}_{t=1}^{\infty}$, $\left\{ P_t^T, P_t^{NT} \right\}_{t=1}^{\infty}$ *and the initial land*

[15] We are ultimately interested in steady state land prices, and thus, since consumptions are constant, the marginal utility of consumption in t and $t+1$ cancel out in the asset pricing equation and the choice of the utility function is irrelevant.

endowments $\left\{L_{j0}^{T}, L_{j0}^{NT}\right\}_{j=1}^{N}$, *the sequences* $\left\{c_{jt}, x_{jt}^{T}, x_{jt}^{NT}\right\}_{t=1}^{\infty}$ *for* $j = 1, .., N$ *solve the agent's optimization problem.*

ii) The government allocates all expropriated land each period:

$$\sum_{j=1}^{N} L_{jt}^{g} = \phi \sum_{j=1}^{N} \Phi_{jt} \left[L_{jt}^{NT} - x_{jt}^{NT}\right], \quad \forall t.$$

iii) Land markets clear each period:

$$\sum_{j=1}^{N} x_{jt}^{T} = \overline{L^{T}} \quad \textit{and} \quad \sum_{j=1}^{N} x_{jt}^{NT} = \overline{L^{NT}}, \quad \forall t.$$

This economy has two rental rate steady state equilibria depending on the allocation of untitled land. The first equilibrium achieves the first best allocation while the second does not. To see this, one can think of the probability of expropriation as a tax to untitled land if leased. As a result, depending on the initial land allocation, farmers may initially trade untitled for tilted land to avoid leasing untitled land. After trading takes place, if ownership of untitled land for some farmers are still higher than the average ownership, then the second equilibrium arises, but if trading succeeds in redistributing untitled land in such a way that no farmer has more untitled land than the average ownership, then the first equilibrium is achieved.

In this equilibrium all untitled land is self-cultivated and never subject to expropriation. All farmers cultivate the same amount of land equal to the average ownership, and thus only titled land is leased to equalize the marginal product of land across farmers, achieving a Pareto optimum. This equilibrium is also a steady state.

In the second equilibrium, due to the possibility of expropriation, there is a wedge between what the lessor of untitled land earns and what the lessee would pay, a situation well known in the taxation literature. Due to this price differential, the marginal returns to land will not be equalized between the land owner and the tenant. As a result, farmers who lease titled land earn a rent as it becomes a scarce factor.

Depending on the distribution of untitled land after re-trading, farmers that own more untitled land than the average ownership, may decide not to lease out the excess untitled

land because what they would earn in expectation is lower than the returns to cultivating the land themselves. In this case, although there is no expropriation because all untitled land is self-cultivated, the marginal product of land across farmers is not equalized and thus the first best is not achieved. However, if the resulting distribution of untitled land after trading is still "too unequal", some farmers may want to venture and lease some untitled land. In this case many equilibria are possible depending on the farmers' expectations of government allocation policies and the subsequent trading. Many of these equilibria may eventually revert to the first equilibrium.[16]

We are particularly interested in the steady state equilibria as the data we have are cross-sectional. We therefore assume that if the untitled land allocation is such that untitled land is eventually leased, the government allocation policy and land endowments are such that the first best can never be achieved via land trading. With this assumption, the equilibria in this economy are given in the following proposition:

Proposition 1 *Let $L^{NT}_{\max t}$ be the maximum amount of untitled land held by any farmer. Then,*

i) If $L^{NT}_{\max t} \leq \frac{\overline{L^T}+\overline{L^{NT}}}{N}$, then, the land cultivated is given by $x^{NT}_{jt} = L^{NT}_{jt}$, $x^{T}_{jt} = \frac{\overline{L^T}+\overline{L^{NT}}}{N} - x^{NT}_{jt}$, the rental rate is

$$R_t = R^{FB} = f'\left(\frac{\overline{L^T} + \overline{L^{NT}}}{N}\right) = f'(x^{FB})$$

and the price of titled land is $P^T = \frac{\beta R}{1-\beta}$.

ii) If $L^{NT}_{\max t} > \frac{\overline{L^T}+\overline{L^{NT}}}{N}$, there exists two and possibly three groups of farmers of sizes N^{RI}, N^{I} and N^{RO} and two land cultivation levels x^{RI}, x^{RO} such that,

$$f'(x^{RI}) = R, \quad f'(x^{RO}) = \frac{1-\beta}{1-\beta(1-\phi)}R$$

[16] If the government was to systematically redistribute expropriated land to farmers that are landless or have relatively little land, in such a way that untitled land holdings became more equal over time, then eventually untitled land would not be leased. Depending on the resulting distribution of untitled land, trading of land can achieve the first best equilibrium.

and

$$N^{RI}x^{RI} + \sum_{j=1}^{N^I} L_j^{NT} + N^{RO}x^{RO} = \overline{L^{NT}} + \overline{L^T}.$$

While $N^{RI} > 0, N^I > 0$ always, it may be the case that $N^{RO} = 0$. The price of titled and untitled land is given by, respectively,

$$P^T = \frac{\beta R}{1-\beta} \quad \textit{and} \quad P^{NT} = \frac{\beta R}{1-\beta(1-\phi)}.$$

Figure 1 plots the marginal product of land against untitled land ownership for both cases of Proposition 1. In Case i), all farmers cultivate at the same scale. In Case ii) farmers included in N^{RI} have holdings of untitled land that satisfy $L_j^{NT} < x^{RI}$. Likewise, farmers in N^I hold untitled land that satisfy $x^{RI} < L_j^{NT} < x^{RO}$. In this case, they lease out all their titled land and only cultivate their untitled land. For these farmers, the marginal product of land is given by the amount of untitled land own. Finally, farmers in N^{RO} have holdings of untitled land that satisfy $L_j^{NT} > x^{RO}$. In this case, they lease out all titled land and also any untitled land in excess of x^{RO}. Thus, if the agent with most untitled land has less than x^{RO}, then no agent will lease untitled land and $N^{RO} = 0$. Notice that in this case there is a positive probability of expropriation ϕ without any expropriation taking place.

We can rewrite the asset pricing equations in Proposition 1, Case ii) as capitalization ratios (cap ratios) $\frac{R_t^i}{P_t^i}$ for $i = NT, T$, a ratio commonly used in the real estate literature.

$$\frac{R^T}{P^T} = \frac{1-\beta}{\beta} \quad \text{and} \quad \frac{R^{NT}}{P^{NT}} = \frac{1-\beta(1-\phi)}{\beta}$$

If we let the discount rate $\beta = \frac{1}{1+r}$, where r denotes the interest rate, we can then write,

$$\frac{R^T}{P^T} = r \quad \text{and} \quad \frac{R^{NT}}{P^{NT}} = r + \phi. \tag{1}$$

The expression above indicates that the cap ratio for untitled land is positively related to ϕ and r. This is a testable implication that will be explored in Section 5.

In sum, if there is a risk of expropriation $\phi > 0$, then most, if not all of the land leased

will be titled. In addition, the cap ratio will be higher for untitled land. However, if there is no risk of expropriation, then agents are indifferent to leasing either type of land and the cap ratio is equalized.

3.1 Discussion

In the context described by the model, agents could also avoid having to lease untitled land by hiring laborers that would work under them. Since these employees would be supervised and would have no actual discretion in managerial decisions, landowners would appear to be self-cultivating the land and thus would not be subject to expropriation. The model, however, does not allow for this possibility as household labor is considered fixed. In other words, instead of using the labor market, agents in the model can only adjust their production decisions using the land rental market.

The data described in the next Section show that most agricultural activities are undertaken by family labor, as assumed in the model. Although laborers are hired, they only perform specific tasks such as land preparation or harvesting. The supply of agricultural laborers may be restricted due to two reasons. First, because there are better paying off-farm employment opportunities, as the data in the next Section seem to suggest. Second, following Jacoby and Mansuri (2004), because supervision costs may be so high (or managerial ability so low) that landowners prefer to lease land, even facing expropriation, than to become managers. Under this last interpretation, the cost of expropriation can be seen as a lower bound to these supervision costs.

4 Data

The data come from the Townsend-Thai dataset, a specialized but substantial cross sectional survey conducted in Thailand in May l997. It contains a wealth of pre-crisis socioeconomic data on 2,880 households.[17] The survey instruments collected current and retrospective information on landholding patterns and characteristics about all plots cultivated and owned. The sample is special in that it was restricted to two provinces in the relatively poor semi arid Northeast and two provinces in the more industrialized central

[17]See Townsend et al. (1997) for more details on the data.

corridor around Bangkok. Within each province, 48 villages were selected in a stratified clustered random sample at the sub-county level. The stratification, as described in Binford et al. (2003), ensured a representative sample of forested and non-forested sub-counties and excluded urban sub-counties. Within each village, 15 households were selected at random.

As an example of a province, Figure 2 contains a map of Chachoengsao in the central region displaying the land use and location of the surveyed villages. The area in light gray denotes land used for agriculture, whereas the darker area is forest cover. The map also shows, with a thick line, the official boundary of the forest area according to the Forest Reserve Act of 1964. It is clear from Figure 2 that most of the land officially declared as protected forest is used for agriculture. In addition, while some villages fall inside this forest reserve, others are located far away from it.[18] Villages are shown in different shapes depending on the land ownership titles reported by the households interviewed. There is a sense in which villages with STK titles, issued by the RFD to squatters inside forest reserves (square), or SPK-4.01 titles, issued by the ALRO in land reform areas (triangle), are nearby or inside forest reserve areas. There are however some villages with SPK-4.01 that are far away from protected forest areas. In these villages, government land (other than protected forest) or private land bought by the government was allocated through the land reform program.[19] Thanks to the sampling scheme, villages are roughly split inside and outside protected forest areas, making it a unique dataset to understand the effects of government policies in forest reserve areas.

Tables 3-5 report, in turn, the characteristics of villages, households and plots. We divide the sample into Forest and non-Forest on the one hand, and Program (P) and non-Program on the other to ease comparisons across sub-samples.

Table 3 shows that forest villages, compared to non-forest villages, have been established later, evidencing the pattern of encroachment into the forest. However, most of these villages were established long before the Forest Reserve Act of 1964, explaining why

[18]Villages are classified as forest (F) villages if they are either located inside a forest protected area according to the TDRI GIS data, or whether the key informant reports that the village has land under a protected forest. The correlation between these two measures is .92.

[19]Villages are classified as program (P) villages if SPK-4.01 and/or STK titles were issued according to the key informant questionnaire (village questionnaire) or the households interviewed with the household questionnaire.

even inside officially declared forest areas most of the land is used for agriculture (Ministry of Agriculture and Cooperatives, 2003 p. 62).

Table 3 also shows that among forest villages, program villages have less titled land but are more likely to have a cooperative. In addition, the connecting road is more likely to be paved. Although the rest of variables are not significant, among villages established before the Forest Reserve Act of 1964, program villages were on average established earlier. Also, more non-program villages had common land, which is land typically forested, managed and protected by the community.[20] These differences in village characteristics seem consistent with the targeting criteria that the RFD and ALRO used (Ministry of Agriculture and Cooperatives, 2003 p. 64; Asian Development Bank, 2002 p. 61 and Fujita, 2003). Since the government perceived these programs as a first step towards future privatization of the land, STK and later ALRO titles were issued in degraded forests suitable for agriculture, that is, villages that would never revert back to being forest reserve again.

The basic identification strategy in this paper can be seen in the first two rows of Table 4 which reports the characteristics of households. While in program villages households tend to lease secured plots, the reverse happens in non-forest and non-program villages. If we restrict the sample to households that simultaneously hold titled and untitled plots, we find that in program and forest areas, 64 percent of leased plots are titled while for own and cultivated plots this percentage drops to 41. In non-program and non-forest areas, we also find the exact opposite: only 46 percent of rented plots are titled, versus a full 68 percent for owned and cultivated plots. This percentage of households with both titled and untitled land is highest in the forest and program areas, confirming the anecdotal evidence of Section 2.

Table 5 reports the type of title for all plots in the sample, which includes those owned and cultivated, those rented in and those rented out. We consider *titled* plots those with certificates NS-4, NS-3 and NS-3K, which allow the owner to transact freely and are also accepted indistinctively by banks as collateral.[21] Plots having any other less secured

[20] In 2002, a controversial bill was passed recognizing the right of forest-based communities to manage their forest. However, the version that was finally approved prohibited community forests in protected areas, as had been advocated by village people, NGOs and academics, involved in negotiations with the government and RFD officials for many years (Vandergeest, 1995 and 1996; Sato, 2000).

[21] See Section 2 for a detailed explanation of the different certificates of ownership.

certificate are considered *untitled*. By definition, there are no STK or SPK-4.01 titles in non-program areas, and no STK title issued in a non-forest area. Notice that there are a few untitled plots in non-forest and non-program areas. These plots could have been cleared from government or royal land other than protected forest, or could be located in private land but the owners never obtained a title deed.

Table 4 also shows that only 3 percent of households have members who are primarily employed as agricultural laborers. This number contrasts with the 38 percent of household with members employed as off-farm laborers. In addition, the majority of agricultural laborers are paid on a daily basis, suggesting that they are only hired during short spells for specific activities. Table 4 also shows that 62 percent of households engaged in agriculture use (unpaid) family labor. All this evidence suggests that agricultural labor is mostly undertaken by household members, thus justifying the assumption of restricted labor markets in the model of Section 3.

In this context, the introduction of RFD or ALRO titles may have affected family labor intensity in program areas, especially in forest areas, as compared to other areas. Table 4 reports the number of farming adults per hectare, showing that labor is more intensely used in non-program areas. Thus, counter to our intuition, we would conclude that land markets may be functioning better in program areas as family labor is allocated more efficiently. However, a glance at Type of Plot columns in Table 5 reveals that in program areas there are relatively more plots (and area) devoted to field crops, requiring less labor than rice. Thus, by looking at the allocation of family labor in general we cannot say much about the efficiency of land markets across sub-samples as households seem to be using different technologies requiring different labor intensities.

When we restrict the sample to households only growing rice, we obtain further evidence of land rental market imperfections in forest and program areas.[22] According to Case ii) of Proposition 1 and the right panel of Figure 1, when undocumented land is leased but subject to expropriation, households that lease out land will cultivate more land than those that lease it in, assuming that all households have the same ability and access to the same technology. Table 4 reports total land cultivated per adult for households that only self-cultivate, lease in and self-cultivate, or lease out and self-cultivate.

[22]Roughly two thirds of the farming households grow only rice, 15 percent only field crops and the remaining 15 percent grow both.

While in general households that lease in land also cultivate more land, possibly because they are more productive than those that leasing it out, in forest and program areas we find the opposite. Thus, households would like to lease more land (in and out) but the fear of expropriation prevents it.

To further bolster this argument, we compute a measure of inequality in total land cultivated and owned for the same sample of rice-growing households. Table 6 reports the Theil index decomposed into households living in forest or non-forest areas and program or non-program villages.[23]

The Theil index for owned land is always larger than that of cultivated land, suggesting that rental markets help in allocating land efficiently. Overall, the distribution of owned land is significantly more unequal in non-program areas than in program areas, but not that of cultivated land. Only in the forest and program areas is cultivated land inequality significantly higher than that of forest and non-program areas. This is remarkable given that inequality of owned land in forest and program is the lowest of all bins while that in forest and non-program in the highest. This again suggests that land markets in forest and program areas may not function properly as the allocation of cultivated land via the rental market is restricted.

The model also suggests that after the introduction of the government program, one would expect households to trade land. That is, in order to avoid expropriation, households with excess untitled land would try to exchange it for titled land that would later be leased. In program areas, therefore, one would expect the land sale market to be more active after the issuance of special titles, and that the new sales would result in untitled land being more equally distributed after the policy is implemented.

Table 7 explores the first hypothesis by looking at the percentage of households across sub-samples that bought and/or sold land. There are significant overall differences across sub-samples in the percentage of households that bought or sold land over the last 20 years, the percentage that only bought land and the percentage that bought only titled and only untitled. It is reassuring to see that very few households bought simultaneously titled and untitled land, as the majority of households that bought land, purchased one

[23]The Theil Inequality Index of variable $x_i, i = 1..N$ is computed as $I_{\text{Theil}} = \frac{1}{N}\sum_{i=1}^{N} \frac{x_i}{\bar{x}} \log\left(\frac{x_i}{\bar{x}}\right)$, where $\bar{x}$ is the mean of variable x. It can be shown that the Theil index is a particular case of the Generalized Entropy Index with $\alpha = 1$. See Cowell (2003) for more details.

type of land only. Again, this evidence does suggest that the land sale market was more active in program areas.

Finally, Table 8 decomposes the inequality in the distribution of ownership of untitled land before and after 1977 for households that existed in 1977. We use how long the household has been in possession of the plot to reconstruct, from current land ownership, how much untitled land it had before and after 1980. Unfortunately, we cannot use households that sold land as we do not know what title the land had when it was sold.

Table 8 shows that untitled land was, in all sub-samples, more unequally distributed before than after the policy. In addition, the distribution of untitled land is more equal in program areas than in non-program areas, and among program areas, it is more equally distributed in forest areas. It thus seems that households allocated untitled land through the market, in an effort to minimize having to lease untitled land. This effort, however, did not suffice because as we will see in the next section, untitled land is being leased.

4.1 Alternative Explanations

Despite the fact that the evidence presented above is consistent with a fear of expropriation story, there could be other explanations for the observed pattern of land leases, especially in forest areas. For example, if most plots in program areas were issued a special title, then little land would be leased, so that cultivated land would equal owned land, as observed in program and forest areas in Table 6. We find that in program areas less than 30 percent of land has a special title, so this story can be dismissed.

Another explanation consistent with titled plots being predominantly leased is as follows. Untitled land could be recently cleared land, thus being more productive than titled land. In this case, households with excess land would cultivate the most productive land while leasing the least productive which happens to be titled land because it is older. Table 9 shows that is not the case. First, the owner has been in possession of titled and untitled land in forest areas for roughly the same time.[24] Second, the price per hectare of titled land is higher, not lower than that of untitled land.

[24] Although in program areas titled land is significantly older than untitled land, the difference disappears when we only consider households with cultivated and rented plots (or with both titled and untitled land, not shown).

5 Econometric Framework

The discussion in the previous section and the model of Section 3 highlights the fact that the decision to lease land may be influenced by whether or not the landlord lives in a program village. In these villages, the landowner faces expropriation of ALRO or RFD plots if these are leased. But more importantly, residents in these areas may believe that unsecured plots will also be expropriated if leased, and thus, they will avoid leasing out untitled plots.

In addition, although not explored in the model, in villages where there is no risk of expropriation, the land owner may prefer to lease unsecured plots if these are of lower quality and tenancy is inefficient. The argument here is that titled land may be correlated with unobserved land quality and unobserved land quality may also drive leasing decisions. The latter could happen if there is adverse selection in the leasing market or if renters face moral hazard as they have an incentive to abuse the land (Bell, 1977, Shaban, 1987, Jacoby and Mansuri, 2003). Under both cases, the landowner would respond by only leasing untitled land, but this would not be an effect of land titling per se but rather of unobserved land quality. In any event, the decision to lease an untitled plots may depend on how important the fear of expropriation is.

The basic regression model we use to explain whether plot i by household j is leased (in or out) or self-cultivated is the following:

$$\begin{aligned} L_{ij} = \alpha_j \quad &+ \quad \delta_{FP} F_j \times P_j \times NT_{ij} + \delta_{FnP} F_j \times (1 - P_j) \times NT_{ij} \\ &+ \quad \delta_{nFP}(1 - F_j) \times P_j \times NT_{ij} + \delta_{nFnP}(1 - F_j) \times (1 - P_j) \times NT_{ij} + X'_{ij}\beta + \epsilon_{ij} \end{aligned} \tag{2}$$

where L_{ij} denotes the leasing decision with value 1 if the plot is leased, α_j captures the household fixed effect, F_j is a dummy with value 1 if household j lives in a forest village, P_j if household j lives in a program village and NT_{ij} takes value 1 if plot i cultivated and/or owned by household j is does not have full ownership rights (NS-4, NS-3 or NS-3K). Finally, X_{ij} are plot level characteristics.

If households living in program areas believe that unsecured leased plots may be expropriated, we should expect $\delta_{FP} < 0$, $\delta_{nFP} < 0$ as titled plots are more likely to be leased in these areas. Likewise, if expropriation is not an issue, and land rights proxy for

unobserved land quality and tenancy may be inefficient, we would expect $\delta_{nFnP} > 0$ as untitled plots are more likely to be leased.

This differences-in-differences approach allows us to make sharper predictions about the behavior of the land market. As posited above (although with the opposite effect) or in the alternative stories of the previous section, any story about unobserved land quality fails to rationalize why one would expect land rights to matter in forest and program areas but not elsewhere. However, it is precisely in program areas where restrictions are enforced that one would expect landowners to fear expropriation.

We now push this hypothesis further and in the spirit of Jimenez (1984), we measure a subjective risk premium by estimating the cap ratios derived in Section 3. We use available data on the asking and rental price of leased plots.[25]

Since the probability of expropriation is highest for unsecured plots located in program areas, we estimate the following regression.

$$\begin{aligned} \log\left(\frac{R}{P}\right)_{ij} = \gamma_0 \quad &+ \quad \gamma_r SI_j + \gamma_{FP} F_j \times P_j \times NT_{ij} + \gamma_{FnP} F_j \times (1-P_j) \times NT_{ij} \\ &+ \quad \gamma_{nFP}(1-F_j) \times P_j \times NT_{ij} + \gamma_{nFnP}(1-F_j) \times (1-P_j) \times NT_{ij} + \epsilon_{ij} \end{aligned} \tag{3}$$

where SI is a dummy indicating access of household j to a given financial institution that collects deposits either because such institution is present in the village or because the household reports having savings in that institution. If there is expropriation risk, we should expect $\gamma_{FP} > 0, \gamma_{nFP} > 0$.

It would seem that there is some difficulty in testing the proposition because land in forest areas cannot be legally sold since it is government property. However, according to Feder et al. (1988) and a government report (Ministry of Agriculture and Cooperatives, 1993), in practice all land in Thailand, including forest reserve land, is traded.

[25]The survey asked the current value of the plot but not the rental value if it was leased. However, the income and expenditure section of the survey are very detailed so payments from renting land as revenue or expenditures were recorded. Since the amounts reported were totals for all plots, we focus on those households that lease in and/or out at most one plot.

6 Results

Table 10 presents the estimation results for the regression of the determinants of plot rental given in (2). We consider two different specifications depending on whether village or household fixed effects are included. When village fixed effects are included, we control for households characteristics but the coefficients are not reported due to lack of space. These specifications have fewer observations due to missing variables in some of the controls. We run each specification using the sample of all plots and, alternatively, only own and rent out plots in order to avoid a potential double-counting problem of rented plots.[26] In each case, the sub-sample of plots with either STK or SPK-4.01 titles is excluded. We run each specification using OLS method and conditional logit. By definition, the conditional logits are estimated using only the sample of households with multiple plots that simultaneously rent out and self-cultivate. Thus, the number of observations is smaller.

Across specifications, leased plots tend to be of larger size and farther away from the house. The estimated role of land security coincides with the discussion of Section 2 and the theory of Section 3. When village fixed effects are included, land rights only matter in forest and program areas matter given that the restrictions in the program titles where only enforced inside forest reserves. However, especially in the specification where all plots are used, land rights may be proxying for land quality in non-forest areas as unsecured plots are more likely to be leased out. This effect disappears, however, when household fixed effects are included. In this specification, land rights still matter in enhancing the land rental market in program and forest areas.

We now turn to the estimation results of the cap ratio in (3) using titled and untitled rented plots, excluding those with program titles. These are reported in Table 11. We find evidence of a larger cap ratio for unsecured plots in forest and program areas, indicating the presence of a risk of expropriation premium. A back of the envelope calculation from the estimated coefficients provides an expected probability of expropriation in forest and program areas of 6 or 17 percent, depending on the controls used.[27] In a very different

[26] A rented plot could be double-counted if both the landlord and the tenants were in the sample. This plot would be recorded under the landlord as rented out and under the tenant as rented in. In any event, since no effort was made during the data collection to match landlords and tenants, the probability is double-counting is low.

[27] Since the regression is run in logs, the parameter ϕ is computed as follows: $\phi = e^{\gamma_0+\gamma_r}\,[e^{\gamma_{FP}} - 1]$.

context, Jacoby et al. (2002) estimate a median (mean) hazard rate of 10 (16) percent.

From the data, we estimate that 3 percent of households in forest and program areas have leased STK or SPK-4.01 plots. This means that in the course of 20 years, and according to the estimated probability of expropriation, between 2.1 percent and 3.5 percent of households would see their program titled plots expropriated, depending on the assumptions.[28] Surprisingly, the data show that in forest and program areas, an average of 2.5 percent of households report having land expropriated over the last 20 years.[29]

Thus, although the model suggests that the probability of expropriation could be compatible with much lower expropriation taking place, we find that the estimated (expected) rate of expropriation roughly coincides with the rate at which the government has expropriated land. When STK and SPK-4.01 are included in the regression (not shown in Table 11) the estimated risk premium is always significant and slightly higher in most specifications. This means that the subjective risk premium may not be much higher for STK and SPK-4.01, and so the use of the subjective risk premium $\phi = 0.61$ is warranted.

Using the estimated probability of expropriation we can compute the wedge between the marginal productivity of households that lease in as compared to those that lease out (see Proposition 1). If we use the implied interest rate from Table 11, we find a difference in marginal productivity of 80 percent.[30] This difference assumes that all households have the same productivity and access to the same technology.[31] From Table 4, it seems that

[28] Let γ be the percentage of people in a given year that violate the special title restrictions by leasing out program plots. The upper and lower bounds on the probability of being expropriated over 20 years can be defined by assuming that a fraction γ of either *different* people violate the rules or the same fraction γ violate the rules every year. If a different percentage γ of people were to violate the rules, then one would see a percentage $\left[1-(1-\phi\gamma)^{20}\right]$ of people that would claim expropriation over the course of 20 years. Notice that this fraction converges to 1 as the number of years increases to infinity. The lower bound assumes that the same percentage of people violates the rule every year. In this case, a fraction $\left[1-(1-\phi)^{20}\right]\gamma$ would claim expropriation over 20 years. This fraction converges to γ as the number of years increases arbitrarily. Using the fact that $\gamma = 0.03$ from the data and that $\phi = 0.061$ as per the specification in (3) that controls for the existence of a financial institution in the village, the lower bound is 2.1 percent and the upper bound 3.5 percent.

[29] Although the survey did not ask directly whether households had land expropriated, it does ask whether households lost land in the last 20 years. We then tabulate the "Other" category as a reason for the loss, and find a few households who report expropriation.

[30] If instead we use the 5 percent deposit rate paid by BAAC, the difference in marginal productivity drops to 50 percent. The wedge or difference in marginal productivity is computed as $\frac{\phi}{r+\phi}$.

[31] When we run the cap ratio regression for the plots owned by the sample of households that grow rice, the difference in marginal productivity is only slightly lower.

among rice growers, those households that lease in land are more productive than those leasing out because on average they cultivate more land per adult. Therefore, although the true estimate is probably lower, the perceived fear of expropriation results in a sizeable distortion.

7 Conclusions

This paper shows empirically how a government policy created an unforseen negative externality. In this sense, we go a step further than Feder et al. (1988b) and argue that the issuance of land reform and STK titles was not only ineffective because it provided small private benefits to holders, but that in fact, it distorted the land market by triggering a sense of insecurity among land owners.

Despite equity arguments in favor of land reforms, in Thailand there has historically been little land inequality. In addition, as documented in several articles that appearing in the Bangkok Post and Vandergeest (1996), land reform in Thailand over the last decade has been subject to land grabbing and rent seeking by the wealthy. It may thus seem that the cost from reduced efficiency outweighs the benefit of redistributing.

More generally, the paper sheds light into the relevance of the timing and the design of property rights reforms. The lesson to be learned from Thailand is that partial rights may have led to a worse situation than no rights at all.

A more sensible policy would be to provide full ownership rights to squatters in these areas, which for the most part have long been settled, are suitable for agriculture and do not pose a threat to the environment. In frontier areas where continuing cultivation causes damage to the environment, the control may be best left to the government (Asian Development Bank, 2002).

The findings of this paper support Banerjee's (1999) argument that allocated land should bear the right to be leased. If RFD or ALRO titles allowed for this possibility, one would avoid some of the inefficiencies still observed nowadays in program and forest areas.

In this sense, the recent government policy that promotes "asset capitalization" is encouraging. In 2003, the Assets Capitalization Bureau was established to review the property rights of assets so that they could be used as collateral, thereby improving the

access to capital of their owners. Since land is one of the assets considered, government agencies such as ALRO and RFD have to revise the regulations in order to facilitate the transferring and leasing of land. In some instances, program titles may be converted to full titles, as the STK program intended in its origins but it never implemented. Although it is still too early to assess the impact of this new policy, the findings here augur its success.

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Table 1: Distribution of Sampled Plots by Document Type in Buriram

	Before LTP		After LTP	
	Agricultural Plots	Residential Plots	Agricultural Plots	Residential Plots
Document Type				
NS-4	0.10	0.04	0.40	0.30
NS-3 or NS-3K	0.30	0.20	0.16	0.24
Other	0.60	0.76	0.44	0.46
N. Observations	278	171	749	1,282

Note: An observation is a plot. Data from before the LTP come from Table 1 in Chalamwong et al.(1988) study. Data after the LTP come from the Townsend-Thai data set.

Table 2: Land Reform Areas and Beneficiaries: 1975-2003

	Public Land			Private Land		
	A. Decl	A. Alloc	N. Benef	A. Decl	A. Alloc	N. Benef
North	2,364.8	845.8	377,250	26.6	25.5	8,400
North East	4,553.3	2,054.4	794,581	1.9	1.4	756
Buri Ram	331.6	91.2	43,608	0.3	0.2	175
Si Sa Ket	243.3	163.2	91,200			
Central	1,423.7	491.2	150,156	48.9	47.2	20,148
Chachoengsao	106.5	49.6	12,081	8.7	8.0	3,095
Lop Buri	78.8	45.8	11,105	4.7	4.2	1,712
South	1,219.3	377.2	157,019	0.3	0.2	107
Whole Kingdom	9,561.1	3,768.6	1,479,006	77.6	74.3	29,411

Note: Data come from ALRO and own calculations. Area Declared (A. Decl) is total area declared as Reform Area in 1,000 hectares. Area Allocated (A. Alloc) is actual land allocated to date in 1,000 hectares. Number of Beneficiaries (N. Benef) are individuals.

Table 3: Village Characteristics

	Whole Sample		Forest		Non-Forest	
			P	non-P	P	non-P
	Mean	SD	Means			
Years since establishment	97.7	76.2	73.0	87.1	79.8	131.8
Years since establishment[a]	111.2	76.1	96.6	90.4	87.9	136.3
Village Population	741.6	932.4	731.4	607.4	603.1	849.9
Landless households (Pct)	0.21	0.24	0.22	0.15	0.24	0.30
Titled land (Pct)	0.62	0.44	0.28	0.61	0.60	0.94
Common Land in village (1=yes)	0.20	0.40	0.28	0.33	0.22	0.08
Formal Bank in vil. (1 = yes)	0.52	0.50	0.55	0.39	0.64	0.47
Cooperative in vil. (1 = yes)	0.19	0.40	0.16	—	0.28	0.23
River in village (1 = yes)	0.12	0.32	0.13	—	0.11	0.14
Canal in village (1 = yes)	0.21	0.41	0.13	0.11	0.25	0.30
Kms. to main road	2.70	4.54	3.91	2.17	2.40	1.90
Pct. pavement in sec. road	0.44	0.47	0.51	0.26	0.42	0.44
N. of Observations	191		64	18	36	73

[a] Computed excluding villages established after 1964.

Note: Data come from the key informant survey of the Townsend-Thai dataset. Each observation is a village. P refers to Program villages.

Table 4: Household Characteristics

	Whole Sample		Forest		Non-Forest	
			P	non-P	P	non-P
	Mean	SD	Means			
Land Characteristics						
Pct. Of Own-Cultivated Plots with full rights title	0.60	0.47	0.26	0.63	0.58	0.92
Pct. Of Rented Plots with full rights title	0.65	0.47	0.34	0.72	0.59	0.89
Pct. Of Rented Out Plots with full rights title	0.69	0.45	0.42	0.75	0.69	0.90
Pct. Of Households with titled and untitled land	0.17	0.38	0.22	0.19	0.21	0.10
Total Land Cultivated per Adult for Rice Farmers[a]						
Households that only self-cultivate	1.42	1.33	1.44	1.35	1.41	1.43
Households that lease in	2.03	1.91	1.51	1.80	2.63	2.03
Households that lease out	1.67	1.59	1.78	1.60	1.08	1.80
Total Land Owned in hectares	2.70	4.69	3.31	2.81	3.19	1.88
Total Land Cultivated in hectares	3.15	4.63	3.44	3.12	4.32	2.33
Household Characteristics						
Pct. Of Members in Agriculture	0.48	0.38	0.53	0.60	0.49	0.40
Pct. Of Households with Agric. Laborers	0.03	0.16	0.03	0.02	0.02	0.02
Pct. Of Households with off-farm Laborers	0.38	0.48	0.33	0.21	0.43	0.4
Pct. Of Households with Family Labor in Agric.	0.62	0.49	0.68	0.73	0.57	0.66
Size of Household	4.57	1.96	4.66	4.43	4.47	4.58
N. Adults per Hectare	1.25	1.58	1.15	1.20	1.05	1.49
N. Relatives in Village	3.83	3.40	3.75	4.74	4.11	3.55
N. Children outside Village	1.47	1.96	1.39	1.41	1.42	1.58
Years of Residence in Village	34.6	19.3	28.4	32.9	35.7	40.0
Sex of Head (1 = Male)	0.77	0.42	0.80	0.81	0.78	0.73
Age of Head (Years)	51.4	13.6	49.2	48.8	51.8	53.8
Education of Head (Years)	4.12	2.62	3.98	4.13	3.72	4.43
Member of Committee Village (1 = Yes)	0.09	0.29	0.10	0.11	0.10	0.08
Savings from Com. Bank or Baac (1 = Yes)	0.70	0.46	0.65	0.70	0.75	0.72
Household Wealth in Million Baht	0.07	0.14	0.05	0.04	0.07	0.09
Agricultural Wealth in Million Baht	0.02	0.07	0.02	0.03	0.03	0.02
Constraints in Farming (1 = Yes)	0.58	0.49	0.64	0.66	0.59	0.49
Related to the Tenant	0.26	0.44	0.29	0.33	0.31	0.19
Related to the Landowner	0.20	0.40	0.24	0.30	0.18	0.13
N. of Observations	2,874		973	270	540	1,091

[a] A sample of 1,415 farmers only growing rice is used.

Note: Data come from Townsend-Thai dataset. Each observation is a household. P refers to Program villages. Constraints Related to Tenant refer to responses to the question "What prevents you from increasing the size of your farm?" like "not enough land" or "not enough money to buy land" while responses like "not enough labor to hire" refer to constraints related Landowner.

Table 5: Plot Characteristics

	Whole Sample		Forest		Non-Forest	
			P	non-P	P	non-P
	Mean	SD	Means			
Type of Title						
NS-4	0.42	0.49	0.16	0.45	0.35	0.71
NS-3	0.15	0.35	0.10	0.17	0.17	0.18
NS-3K	0.02	0.15	0.02	0.01	0.03	0.03
SK-1	0.03	0.16	0.04	0.02	0.02	0.02
SPK - 4.01	0.11	0.32	0.18	—	0.24	—
STK	0.01	0.10	0.03	—	—	—
Tax (Por Bor Tor)	0.09	0.28	0.19	0.09	0.03	0.01
No Document	0.09	0.29	0.14	0.08	0.11	0.04
Type of Plot						
Residential	0.37	0.48	0.36	0.33	0.38	0.4
Paddy	0.36	0.48	0.32	0.45	0.32	0.39
Field	0.14	0.35	0.23	0.09	0.19	0.05
N. of Observations	7,892		2,762	843	1,491	2,796

Note: Data come from the Townsend-Thai dataset. Each observation is a plot. P refers to Program villages.

Table 6: Cultivated and Owned Land Inequality per Adult

	Forest	Non-Forest	Total
Program Areas			
Total Cultivated Land	0.38**	0.35	0.37
Total Owned Land	0.50**	0.60	0.54**
Non-Program Areas			
Total Cultivated Land	0.33**	0.35	0.34
Total Owned Land	0.64**	0.60	0.62**
Total			
Total Cultivated Land	0.37	0.35	0.36
Total Owned Land	0.54**	0.60**	0.66

Note: Data come the Townsend-Thai dataset. A sample of 1,415 farming households only growing rice is used. The symbol ** indicate significant differences across sub-samples at a 5 percent level. Standard errors are computed using the bootstrap method with 500 repetitions.

Table 7: Trading of Land After 1980

	Whole Sample		Forest		Non-Forest	
			P	non-P	P	non-P
	Mean	SD	Means			
Pct. Of Households that...						
Bought or sold land	0.34	0.47	0.39	0.31	0.30	0.33
Only sold land	0.09	0.29	0.07	0.07	0.10	0.11
Only bought land	0.21	0.41	0.27	0.21	0.18	0.19
Bought Titled and untitled land	0.01	0.09	0.02	0.01	0.01	0.00
Only bought titled land	0.12	0.33	0.05	0.11	0.11	0.20
Only bought untitled land	0.12	0.33	0.25	0.13	0.09	0.02
N. of Observations	2,874		973	270	540	1,091

Note: Data come from the Townsend-Thai dataset.

Table 8: Owned Untitled Land Inequality

	Forest	Non-Forest	Total
Program Areas			
Before (1977)	1.23	1.63	1.37
After (1997)	0.83	1.18	0.96
Non-Program Areas			
Before (1977)	1.97	3.43	3.01
After (1997)	1.36	2.93	2.40
Total			
Before (1977)	1.37	2.48	1.90
After (1997)	0.94	2.03	1.46

Note: Data come the Townsend-Thai dataset. A sample of 1,896 households that did not sell land and that have been household heads for at least 20 years is used. The difference in inequality between 1977 and 1997 is significant at the 1 percent level for all sub-samples. Standard errors are computed using the bootstrap method with 500 repetitions.

Table 9: Characteristics of Owned-Cultivated and Rented Out Plots

	Whole Sample		Forest				Non-Forest			
			Program		non-Prog		Program		non-Prog	
			T	NT	T	NT	T	NT	T	NT
	Mean	SD	Means							
Mode of Acquisition										
Purchased	0.34	0.47	0.23	0.42	0.27	0.49	0.33	0.31	0.31	0.32
Inherited	0.57	0.50	0.71	0.41	0.71	0.44	0.55	0.51	0.66	0.58
Cleared	0.04	0.20	0.03	0.08	0.01	0.06	0.05	0.08	0.01	0.06
Allocated (land reform)	0.02	0.15	0.01	0.06	—	—	0.02	0.05	—	—
Distance to House (km)	1.43	5.23	2.15	1.37	0.96	1.40	1.19	1.88	1.25	2.57
Size of Plot (hectares)	1.22	2.36	1.21	1.44	0.91	1.45	1.34	1.80	0.93	1.05
Years of Ownership	18.2	13.5	18.4	16.3	17.4	15.5	19.7	17.8	19.8	18.6
Years of Ownership[a]	16.2	12.7	15.4	14.8	14.8	15.0	16.6	17.3	17.5	16.9
Value of Plot per Hectare (1,000 Baht)										
Residential	1,251.8	2,211.5	1,031.4	479.2	981.2	235.5	1,178.2	572.9	2,192.2	1,828.6
Agricultural	392.2	1,001.9	209.5	121.5	304.4	208.5	466.5	175.6	774.7	277.1
N. of Observations	6,256		641	1,669	425	250	622	476	2,025	148

[a] Only for owners that cultivate and rent out. A total of 2,003 plots are used in the calculations.

Note: Data come from the Townsend-Thai dataset. T refers to titled (full ownership) plots (NS-4, NS-3, NS-3K), while NT to non-titled plots.

Table 10: Determinants of Plot Rental

The dependent variable is a dummy variable indicating whether the plot is leased. When the regression has village-level fixed effects, the household controls include number of adults in the household, number of relatives in the village, number of relatives outside the village, household size, number of household members engaged in farming, age of head, sex of head, years of education of head, whether the head has a position in the village committee and household wealth. SE are in parenthesis. P refers to Program village, while F to Forest village. * significant at 10%, ** significant at 5% and *** significant at 1%. Only titled and untitled plots (other than STK or SPK-4.01) are used.

	All Plots		Own and R.Out Plots		All Plots		Own and R.Out Plots	
	OLS	C. Logit	OLS	C. Logit	OLS	C. Logit	OLS	C. Logit
Plot Characteristics								
No rights × F and P	-0.089***	-0.758***	-0.042***	-1.134***	-0.181***	-1.793***	-0.099***	-1.911***
	(0.030)	(0.230)	(0.017)	(0.463)	(0.037)	(0.507)	(0.029)	(0.791)
No rights × F and non-P	0.001	-0.011	-0.055*	-1.629	-0.130**	-1.061*	-0.055	-0.299
	(0.047)	(0.297)	(0.030)	(1.006)	(0.058)	(0.577)	(0.048)	(1.079)
No rights × non-F and P	0.128***	0.987***	0.022	0.987	-0.028	-0.175	-0.067	-0.439
	(0.039)	(0.266)	(0.025)	(0.649)	(0.054)	(0.466)	(0.044)	(1.037)
No rights × non-F nor P	0.118***	0.553**	0.015	0.434	0.072	0.249	-0.048	-0.307
	(0.044)	(0.272)	(0.032)	(0.810)	(0.050)	(0.323)	(0.046)	(0.647)
Distance from House in Km	0.008***	0.047***	0.009***	0.062***	0.011***	0.090***	0.012***	0.270***
	(0.001)	(0.010)	(0.001)	(0.012)	(0.001)	(0.015)	(0.001)	(0.051)
Size of Plot in Rai	0.029***	0.180***	0.008***	0.169***	0.028***	0.336***	0.012***	0.137***
	(0.003)	(0.021)	(0.002)	(0.039)	(0.002)	(0.034)	(0.002)	(0.050)
Fixed Effects	Village	Village	Village	Village	Household	Household	Household	Household
N. Observations	4,646	4,487	3,715	2,201	6,607	2,277	5,355	844
LR χ^2	409.8	367.63	237.29	110.12	495.83	270.16	440.28	147.5

Table 11: Determinants of Cap Ratio

The dependent variable is the cap ratio. Since the rental value for each leased plot is not reported, but only the total revenue and expenses from land rental, we only use households that lease in and/or our at most one plot. In the regressions, only titled and untitled plots (other than STK or SPK-4.01) are used. SE in parenthesis. P refers to Program village, while F to Forest village. * significant at 10% and *** significant at 1%.

	No Controls	Village	Household
Plot Characteristics			
No rights × F and P	1.611***	1.667***	1.940***
	(0.204)	(0.215)	(0.226)
No rights × F and non-P	0.746*	0.591	0.731*
	(0.414)	(0.392)	(0.447)
No rights × non-F and P	-0.197	-0.387	-0.110
	(0.446)	(0.446)	(0.479)
No rights × non-F nor P	-0.204	-0.024	-0.115
	(0.527)	(0.473)	(0.519)
Savings Institution			
Commercial Bank or BAAC branch in village		0.861***	
		(0.227)	
Savings Cooperative in village		0.019	
		(0.299)	
Village-level Microfinance Institution		0.947***	
		(0.238)	
Household has savings in Com. Bank or BAAC			-0.206
			(0.241)
Household has savings in Cooperative			-0.784***
			(0.319)
Household has savings in village-level institution			0.943***
			(0.379)
Constant	-4.572***	-5.201***	-4.524***
	(0.141)	(0.194)	(0.228)
N. Observations	425	425	425
R-Squared	0.08	0.15	0.13

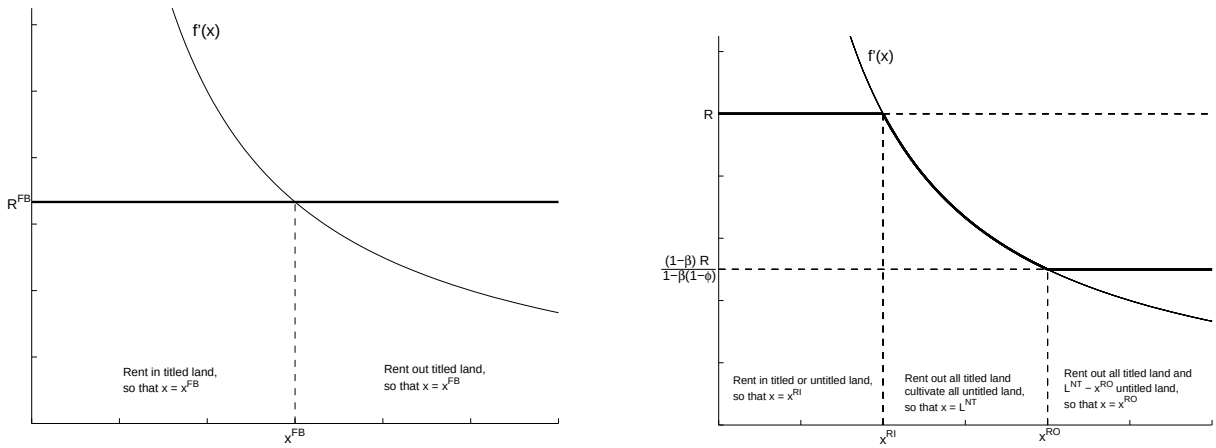

Figure 1: Marginal Product of Land in Proposition 1 Case i) (left) and Case ii) (right).

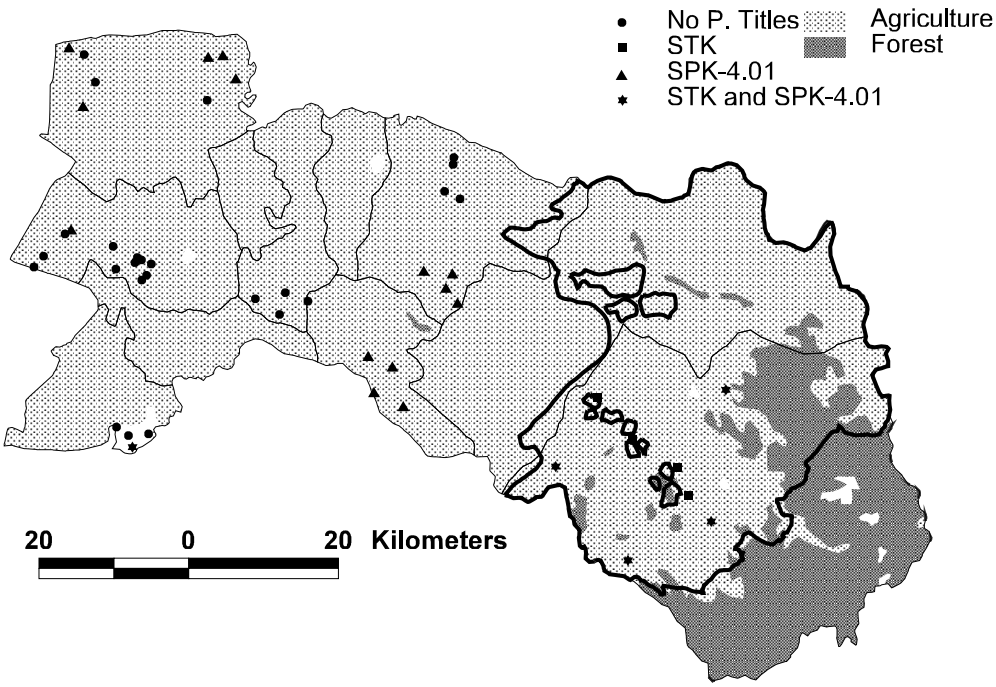

Figure 2: Land Use in Chachoengsao

Location of surveyed villages comes from Townsend-Thai data. Land use and forest reserve boundaries come from TDRI data.