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Land Registration and Titling from an Economist's Perspective: A Case Study in Rural Thailand

by

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A CASE STUDY IN RURAL THAILAND

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I. Introduction

The establishment or upgrading of cadastres and land registration systems is viewed by many as an essential infrastructure investment to be considered by less developed countries (Doebele, 1983; Williamson, 1982, 1983, 1985). The benefits to be derived from such investments are well known, and have been listed in some detail by Simpson (1976) and Williamson (1985). While most of these benefits pertain to improvement in the economic environment, and hence, increased productivity, there has been a paucity of quantitative information to indicate the magnitudes of these benefits. Knowledge of magnitudes is important, as governments face many competing claims for the public resources available for investment. Thus, while many will agree that cadastres and land registration are useful, a decision to actually invest in establishing or expanding these activities will be easier to undertake if it is demonstrated that the resulting benefits are higher than those of other public investments.

The purpose of this paper is to report the results of a recent study undertaken in rural Thailand (Feder et al., 1987). The study focused on the economic applications of land titling in the agricultural sector, and utilized farm level data from a sample of about 900 farmers in four Thai provinces. The methodology of the study facilitated not only an estimate of the agricultural productivity gain due to land registration and titling, but also a cost-benefit analysis demonstrating that investment in cadastres and land titling can generate very high returns.
The program of the paper is as follows: The next section reviews theory relating land registration to economic performance. It is followed by a discussion of the land rights system in Thailand. The subsequent two sections describe the methodology utilized in the analysis and the empirical results. A cost-benefit analysis of titling is then presented and the last section summarizes the results.

II. Economic Aspects of Land Registration and Titling

In many countries the evolution of individual land rights and mechanisms to enforce such rights in the rural context is closely related to increases in population density and to advances in agricultural technology. As land becomes scarce, societies which may have practiced shifting cultivation or long fallow periods to maintain land fertility must adopt fertility-restoring technologies that allow continuous exploitation of the land. Because such technologies require investment of both capital and effort, the cultivator must have investment incentives. One would expect investment to be negatively related to ownership insecurity: with increased uncertainty, investment incentives are reduced and current consumption is preferred. With lower capital accumulation, the demand for variable inputs which are complementary to capital is reduced. Output per unit of land is therefore lower when ownership is insecure.

In the early stages of agricultural development, de-facto ownership may not imply substantial uncertainty about a farmer's continued use of the land. Uncertainty tends to increase, however, as commercialization increases and as new technology raises the land's income potential. There is ample evidence that the incidence of land disputes and
land grabbing -- and consequently, tenure insecurity -- increases as the potential return to land increases. Development also increases land transactions (sales, rentals), as efficiency considerations motivate adjustment in the land input to be compatible with other endowments such as farming skills. But as the frequency of transactions between individuals who are not closely related increases, uncertainty over ownership and entitlement to transfer land rights becomes a relevant factor. Individuals are therefore induced to spend resources on reducing uncertainty, and this, in turn, affects the scope and the price of land transactions.

For the cultivator, ownership security is enhanced when the right to continuously cultivate, and the ability to transfer a given tract of land by will or by sale, are secured not only by social custom but also by an effective state-enforced legal system. Thus, population growth and agricultural progress are typically accompanied by formal mechanisms to enforce land rights. A common mechanism is a unified system of Land registration and documentation whereby the state provides the land owner with proof or facilitates proving that a given and well-defined tract of land does indeed belong to him. If the registration system is effective, and if the state can effectively protect the owner from encroachment or false challenges to his ownership, then such a mechanism indeed enhances security.

With agricultural development there is an almost universal emergence of rural credit markets, both formal (e.g. banks) and informal (e.g. money lenders, traders). Credit transactions often require an explicit or implicit collateral. Land is an attractive collateral asset provided that the borrower can assure the lender that he has the ability to
transfer the land. Since lack of clear legal title to rights prevents the mortgaging of land, a secure title can provide easier access to credit, especially credit from formal lending institutions who do not have personal or detailed information on the borrower. For informal lenders, collaterals play a less significant role. These lenders usually base their decision on personal familiarity with the borrower and they have alternative means for enforcing repayment (e.g., social pressures) which are not available to formal lenders. Thus, farmers without secure tenure face fewer disadvantages in the informal credit market than in the formal market. However, informal credit is typically much more expensive than formal credit, and is confined mostly to short-term loans of relatively small magnitude. With limited and more expensive credit, investments and inputs use would be lower among farmers lacking secure tenure and legal title. This leads to lower productivity per unit of land.

It follows that the institution of land registration and titling can have significant economic consequences in the agricultural sector.

While this proposition is generally recognized by economists and development officials, it has not been subject to rigorous quantitative analysis. This lacuna hampers the design and evaluation of policies. Alternative policies and investments are better assessed when some knowledge of the magnitude of their effects is available to policy-makers.

This issue is particularly acute in a country such as Thailand, where rapid expansion of the cultivated area has occurred in the past three decades. Much of this expansion took place through clearing forest areas, and without properly documenting and formalizing farmers' land rights. Many of these farmers operate in designated forest reserve areas owned by
the state. These farmers are considered squatters from a legal perspective.

From the discussion above, it is hypothesized that title and tenure insecurity causes lower farm productivity because investment incentives are reduced and access to credit is limited. This conclusion implies further that the market value of land which is not securely owned (e.g., untitled land) will be less than that of an identical tract of land which is securely held. This implication follows from the fact that the value of land reflects the stream of net incomes which it generates over a long horizon. Since land with secure tenure has higher productivity and is a less risky asset, it has a higher market value.

The causal chain outlined in the discussion above is illustrated in Figure 1. The subsequent sections of the paper present empirical evidence from Thailand substantiating the hypotheses discussed above.
Figure 1: Land Ownership Security and Farm Productivity: A Conceptual Framework

- Titled Land

  More Security to Farmer

  More Demand for Investment

  More Investment

(input complementarity)

  More Demand for Variable Input

  More Variable Input Use

  Higher Output Per Acre

- Titled Land

  More Security to Lender

  More Supply of Cheaper Long Term Credit

  More Supply of Cheaper Short Term Credit

- Higher Land Price

- Higher Income
III. The Land Rights System in Thailand

A detailed discussion of land registration in Thailand has recently been provided by Angus-Leppan and Williamson (1986). Below we provide a summary of pertinent details. The Land Code of 1954 is the basis for the legal land rights system in Thailand today. The Code defines the powers and duties of the Minister of the Interior and the Department of Lands (DOL). All of the land registration documents for land which is not government property are issued by the DOL. The DOL, acting under the Land Code, can adjudicate land rights only for lands which are not designated officially as forest reserves, national parks, etc.

The land documents, referred to by their Thai acronym, correspond to the phases of land acquisition, utilization and legal possession. In terms of ownership security and land rights, we can distinguish between secure and unsecure documents. Although the title deed document (NS-4) is the most secure document, there are two other documents (NS-3 and NS-3K) that accord legal recognition and protection of a farmer's ownership rights over a given tract of land. Full ownership rights as defined here enable the farmer to freely and legally transact with the land.

NS-4

Legal ownership is documented in a full unrestricted title deed called NS-4 (Charod). This document enables the owner to sell, transfer and legally mortgage the land. It is issued on the basis of a precise survey with clear identification of the property marked by boundary stones and is registered in the provincial land register.
NS-3 and SS-3K

The secure documents related to the phase of utilization are NS-3 (Nor-Sor-Sarm) and NS-3K (Nor-Sor-Sam-Kor) — "Certificate of Use" or "Exploitation Testimonial". These documents certify that the occupant has made use of the land for a prescribed period of time. Under the existing legislation, a farmer must first possess an NS-3 or NS-3K document before he can obtain a full title deed (NS-4). The law allows sale, mortgage and other transfers utilizing these documents to record the transaction.

The NS-3 certificates granted between 1954 and 1972 were surveyed in isolation by tape surveys and the land was described in the certificate by graphic 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 plan, and the certificate states that the holder "has possessed and made use of the land."

While the above documents (NS-4, NS-3, and NS-3K) are the only documents which allow the farmer to freely and legally transact with a given tract of land, there are several other documents which provide evidence supporting a farmer's ownership claim. These documents, NS-2 and SK-1, however, do not certify secure gal ownership.

The Thai land administration system shares with other developing countries the problem of Limited funding and an inadequate administrative infrastructure to provide full titles to all eligible farmers. 1/ As a

1/ Recently, however, the government undertook a significant expansion of the titling and land registration capacity through a special project funded partially by external donors.
result, the process of land registration has been rather slow. Only a small proportion (about 12%) of land not claimed by the state is covered by full title (NS-4). Considering the area actually documented (i.e. land with either full title or certificate of utilization), the proportion is 53 percent. In our study areas, primarily agricultural areas, the occurrence of full title deeds (NS-4) was rare.

It is perhaps because of the low occurrence of the full title deeds, that the status and usefulness of the certificates of utilization has risen, blurring the distinction between the NS-4 and NS-3 or NS-3K in rural areas. Although some commercial banks seem to prefer collaterals documented on a full title deed to those documented on a certificate of utilization, there are indications that in practice the differences between the certificates of utilization and full title are rather small. Williamson (1983) and the Ministry of Agriculture and Cooperatives (1980, p. 7) claim that there is little difference between full title and NS-3 or NS-3K. As Williamson states, "banks will lend equally, irrespective of whether the land has a title or a certificate of utilization" (Williamson, 1983, p. 10). Our own field survey and numerous discussions with farmers and land officers indicate that in the rural areas studied there is little distinction between NS-3, NS-3K and NS-4 documents, and that all are taken as evidence of legal ownership by banks and buyers.

Like many other developing countries, Thailand is faced with the problem of illegal occupation and utilization of state-owned land by large numbers of farmers. An estimated 5.3 million hectares or about one-fifth of the land officially designated as state-owned forest reserve, is under permanent occupation and cultivation by squatters. This is about 21
percent of the land under cultivation and involves about one million squatter farm households. Even though many of these squatters had de-facto possession of the land for 15–20 years, they cannot obtain titles or certificates of utilization. The forest reserve areas can be found side by side with the non-forest reserve areas, in neighboring geographical areas located within identical agroclimatic zones and with similar socio-political structures. As the pattern of agricultural expansion in Thailand has always been through a process of forest clearing and settlement, there is no socio-cultural or ethnic difference between the squatters in our study areas and their neighboring legal owners.1/

IV. Methodology and Data

Ownership security is defined in this study as the possession of legal ownership rights, certified by an appropriate state-issued document. Secure ownership entails protection from the risk of eviction, and the ability to legally mortgage and sell the land. Normally, ownership security would be difficult to quantify. In Thailand, however, two groups of farmers are readily distinguishable in their ownership security status. One group comprises squatters who operate farms in forest reserve areas. The other group is composed of legally titled farmers operating outside the forest reserve boundaries. Because ownership security is uniform within each group, comparisons between the two groups circumvent the need to

1/ However, in some frontier areas close to the country's international borders, the squatter population consists of hill tribes who are not ethnic Thai.
actually quantify ownership security and inferences regarding the economic implications of ownership security can be made.

However, to simply compare the economic indicators of the two groups may ignore other important differences between them, and thus invalidate the assessment of the impact of ownership security based on such comparisons. For example, one important factor is the agroclimatic environment in which the farmer operates. There is no point in comparing a titled farmer operating in a fertile valley to a squatter operating in a hilly area; the two differ not only in ownership security status, but also in soil and terrain type.

To avoid false attributions, a key element of the study methodology was to select study sites in which squatters and titled farmers operate in geographical proximity within a similar agroclimatic environment. Accordingly, all observations within a particular study site — both within the forest reserve areas and from adjacent areas outside the reserves — were located within a radius not exceeding 20 miles. Great care was taken to ensure that a study site had similar terrains and infrastructural facilities.

Sites were selected in four provinces which met the required similarity of agroclimatic conditions and geographical proximity of the samples of legal owners and squatters. These were located in Lop Buri province on the fringe of the Central Plain, and Nakhon Ratchasima, Khon-Kaen, and Chaiyaphum provinces in the northeast. Surveys were conducted during the 1985-86 wet season in the first three provinces, and in 1986 for Chaiyaphum province. The sampling design for each province consisted of a random selection in the pre-selected study site of ten
villages in the forest reserve and ten villages in the adjacent non-forest reserve area. Within each village, about 10 farmers were randomly selected.

To account for individual differences between farmers (e.g. initial wealth, location, soil type), the empirical analyses reported in subsequent chapters utilize data on characteristics of the farmer and his farm. These analyses are essentially econometric, employing regression techniques and dichotomous choice models.

Eviction of squatters in forest reserve areas by government officers has been rather rare in Thailand due to socio-political constraints. While overall statistics of eviction frequencies for the country are not available, data from the four provinces surveyed in the context of the present study suggest that the lifetime probability of eviction for a squatter is about 4 percent, a rather low frequency.

The low probability of eviction, combined with the fact that land tax is being collected on squatter's land are factors which enhance the squatters' perception of ownership security. Indeed, when squatters were asked what they perceived as the most important advantage of possessing a secure land ownership document such as NS-3 or NS-3K, the majority stated favorable access to institutional credit.

V. Empirical Results

An examination of credit transactions by sample farmers indicated a marked difference between institutional (formal) and non-institutional (informal) lenders. Institutional lenders often require loan collaterals,
Figure 2: Map of Thailand
while non-institutional lenders do not. This is because non-institutional lenders face a lower borrower-specific risk since they are familiar with the farmers in their area and have better enforcement possibilities. Titled farmers pledged land as collateral in more than half of their institutional loans. Squatters were unable to pledge land as collateral and as a result the amount of institutional credit per unit of land obtained by squatters was less than that obtained by titled farmers. While access to non-institutional credit was not significantly affected by ownership security, the cost of such credit was three times higher. Further, in areas where the non-institutional credit market is not well developed, the loan amounts were limited. Econometric analysis confirmed that the supply of institutional credit is significantly affected by the provision of land collateral. The credit advantages associated with land collateral were larger in provinces where production is subject to high weather risks. Legal owners thus enjoyed substantial advantages (ranging from 52 to 521 percent) in access to cheaper institutional credit. They received significantly more longer term credit and significantly more credit from commercial banks. Commercial bank loans in almost all cases required a land collateral.

Data on land values reported by the sample farmers were used to estimate econometrically the value of legal ownership in the study areas. The estimates account for other variables which might affect land values (e.g., soil quality, market proximity, etc.). In all the provinces studied, ownership security had a statistically significant effect on land prices. The effect is substantial in the northeastern provinces, where the value of
untitled land ranges between one half and two-thirds the value of titled land. The value of legal ownership is much smaller in Lop Buri province (untitled land’s value is 80 percent that of titled land). In Lop Buri the informal credit market is relatively well developed, a fact which probably accounts for the lower value of secure legal title since informal creditors usually do not require a legal collateral.

Econometric analysis of capital accumulation established that in the three northeastern provinces, ownership security induced significantly higher capital/land ratios, holding other farmer attributes constant. The differences in capital/land ratios between titled and untitled farmers ranged from 56 to 253 percent. In Lop Buri the impact of ownership security on capital formation was not significant. Additionally, the adoption of two types of land-improving investments was shown to be significantly affected by ownership security in three of the provinces, holding farmer and land characteristics constant.

In three provinces, data at the household level were suitable for an econometric analysis of the impact of ownership security on input and output. The results in two northeastern provinces confirmed that, ceteris paribus, titled farmers use significantly higher amounts of variable inputs (labor, power, other cash inputs) per unit of land than do untitled farmers. Crop value per unit of land was also higher, by 12 to 26 percent. Differences in Lop Buri province were smaller, and not statistically significant. However, when the analysis used a more general definition of farm income, including income from non-crop agricultural products and non-farm activities, titled farmers performed significantly better than untitled farmers in all three provinces. The differences ranged from 12 to 21 percent. Table 1 summarizes the results of the
Table 1: Differences in Economic Performance Between Untitled and Title Farmers (Ratios of the latter to the former) a/

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Province</th>
<th>Lop Buri</th>
<th>Nakhon Ratchasima</th>
<th>Khon Kaen</th>
<th>Chaiyaphum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Stock per Unit of Land Owned</td>
<td></td>
<td>1.044</td>
<td>2.050*</td>
<td>3.532*</td>
<td>1.559*</td>
</tr>
<tr>
<td>Probability of Improving Land by Bunding</td>
<td></td>
<td>1.184</td>
<td>1.695*</td>
<td>1.411*</td>
<td>1.028</td>
</tr>
<tr>
<td>Probability of Improving Land by Stump Clearing</td>
<td></td>
<td>1.123*</td>
<td>1.474*</td>
<td>1.293*</td>
<td>1.005</td>
</tr>
<tr>
<td>Labor Days per Unit of Cropped Land</td>
<td></td>
<td>1.147*</td>
<td>1.147*</td>
<td>1.052*</td>
<td>n.a.</td>
</tr>
<tr>
<td>Draft Power Expense per Unit of Cropped Land</td>
<td></td>
<td>.946</td>
<td>1.387*</td>
<td>1.269*</td>
<td>n.a.</td>
</tr>
<tr>
<td>Other Input Expenses per Unit of Cropped Land</td>
<td></td>
<td>1.184</td>
<td>1.246*</td>
<td>1.348*</td>
<td>n.a.</td>
</tr>
<tr>
<td>Value of Agricultural Output per Unit of Cropped Land</td>
<td></td>
<td>1.045</td>
<td>1.118*</td>
<td>1.267*</td>
<td>n.a.</td>
</tr>
<tr>
<td>Revenue from Agricultural and Non-agricultural Activities</td>
<td></td>
<td>1.145*</td>
<td>1.127*</td>
<td>1.208*</td>
<td>n.a.</td>
</tr>
<tr>
<td>Value of Land</td>
<td></td>
<td>1.250*</td>
<td>2.326*</td>
<td>2.128*</td>
<td>1.539*</td>
</tr>
</tbody>
</table>

a/ A ratio of 1 implies equal performance for titled and untitled farmers, ratio of 2 implies a 100% difference.

* denotes statistical significance at a 90% (one-tailed) confidence level.
analysis of economic performance criteria. By and large, the empirical work supports the economic theory outlined in Section II.

VI The Benefits and Costs of Land Ownership Security

The purpose of this section is to analyze the economic costs and benefits entailed in providing secured ownership in Thailand. The preceding section provided evidence that increasing the ownership security of untitled farmers by granting them full legal ownership would increase their productivity. The benefit of titled ownership to a farmer can thus be calculated as the present value of the increments to net income which will accrue to his over a lifetime. The increments are defined relative to the stream of net incomes expected under his present insecure ownership status. If the farmer incurs any costs in changing his status, then these need to be subtracted from the benefit of secure ownership. An equivalent measure of the net benefit to farmers is the difference in the value of their land before and after the ownership status change, minus the costs of implementing the change.

The official fee for processing and awarding a secure ownership document, such as NV3-K, to an eligible farmer is relatively very low: 20 to 30 baht per plot. Since plots average about 15 to 25 rai, the official fee translates into about 2 baht or less per rai. In reality, however, farmers pay not only the official fee, but also for the gifts and hospitality that they provide to individuals implementing the ground survey and adjudication process. An estimate of these costs was obtained from the sampled farmers. Mean figures for the provinces in the study are presented

In Table 2, the figures for NS3-K and NS3 documents are listed separately, since mostly NS3-K documents were issued after 1972. The procedure for issuing NS3-K documents implies lower costs to farmers as compared to NS-3. The data confirm that the costs of acquiring an YS3 are considerably higher than those for an NS3-K. However, when expressed per rai of land, the monetary costs of acquiring a secure document are still low, amounting to less than 1 percent of the value of land. The increase in land value due to the acquisition of title ranges from 25 percent of untitled land value in Lop Buri to 132 percent in Yakhon Ratrasima. Clearly, the net benefit of ownership security to farmers is substantial. This suggests that the government fee charged to farmers for survey, adjudication and documentation can be increased significantly from its current low levels. It should not be increased too much however, lest farmers will refuse to obtain title documents. Such revenues can reduce the pressure on public budgets associated with any large-scale land titling efforts.

For policy purposes, however, an assessment of the benefits of providing secure legal ownership should be based on the social costs and benefits rather than on the benefits as perceived by farmers. The net benefits to farmers, as calculated above, could differ from the net benefit to society. This is because of distortions in the market valuation of land prices and because of the discrepancy between the costs paid by farmers for titling services and the real public costs of providing those titling services.

The study developed a theoretical model which shows that if the

1/ Social costs or benefits are a more complete concept of economic value, whereby goods and services are evaluated at the real value of resources required to produce or provide them.
Table 2: Titling Cost to Farmers

<table>
<thead>
<tr>
<th>Item</th>
<th>Province</th>
<th>Lop Buri</th>
<th>Nakhon Ratchasima</th>
<th>Khon-Kaen</th>
<th>Chaiyaphum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average plot size (rai)</td>
<td>Lop Buri</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of YS3 per plot (Baht)</td>
<td>(24)</td>
<td>277</td>
<td>204</td>
<td>450</td>
<td>328</td>
</tr>
<tr>
<td>Cost of NS3 per rai (Baht)</td>
<td></td>
<td>(24)</td>
<td>56</td>
<td>(74)</td>
<td>(7)</td>
</tr>
<tr>
<td>Cost of NS-3K per plot (Baht)</td>
<td></td>
<td>203</td>
<td>49</td>
<td>120</td>
<td>21</td>
</tr>
<tr>
<td>Cost of NS-3K per rai (Baht)</td>
<td></td>
<td>(191)</td>
<td>(191)</td>
<td>(188)</td>
<td>(73)</td>
</tr>
<tr>
<td>Average price of Untitled Land (per rai)</td>
<td></td>
<td>2828</td>
<td>3448</td>
<td>3204</td>
<td>2014</td>
</tr>
</tbody>
</table>

a/ Figures in parentheses indicate sample sizes.
probability of eviction is non-zero, the observed price of untitled land underestimates the expected discounted value of the gross social benefits forthcoming from such land. The overvaluation stems from two sources. One source is the fact that farmers are risk-averse, while society is risk-neutral. Risk aversion implies that the farmers require an additional discount on the price of the risky asset (untitled land) as compared to the price they would be willing to pay under risk neutrality. The second source for undervaluation, however, would remain even when farmers are risk-neutral, or as long as the risk of eviction is non-zero. The reason why private valuation and social valuation of land deviate is because the risk to the farmer is not the same as the risk to society. When a farmer is evicted, he loses both a portion of the stream of outputs and the value of the land. In contrast, society loses a portion of the output, but retains the productive potential of the land.

The theoretical model also shows that when interest rates reflect the real cost of credit then the market price of titled land would equal its social value. However, in a credit market such as that in Thailand, where interest rate ceilings and other interventions are present, the real cost of capital is higher than the interest rate on bank loans. This implies that in Thailand the market price of titled land is higher than its social value.

The magnitude of the gross increase in social welfare resulting from allowing the legal registration of a unit of forest reserve land of a given quality [expressed as a proportion (8) of the market price of untitled land

1/ Risk neutrality is defined as the behavior characterizing an individual who is indifferent between a sure award of $100 and a gamble in which there is an equal chance of getting $200 or nothing at all.
of the same quality] is obtained using a formula

\[ \beta = \frac{P_t}{P_{nt}} \cdot (1 - \delta) \]

where \( P_t \) and \( P_{nt} \) are the market prices of titled and untitled land, respectively, and \( \delta \) is a term less than 1, summarizing the various adjustments which correct the market prices to eliminate the distortions. It can be shown that the ratio of market prices of titled and untitled land for any given land quality is independent of the quality, and thus the inverse of the ratios reported in the last line of Table 1 can be used.

The value of \( \delta \) depends on various assumptions regarding the real rate of interest and the degree of risk aversion. Assuming a real interest rate of 12 percent, and providing alternative estimates for a case of risk neutrality and risk aversion, the gross benefits are reported in column 1 of Table 3. In Lop Buri province the benefits are small, and under the assumption of risk aversion they are negligible. The reason may be, as pointed out earlier, the abundant availability of informal credit in Lop Buri, which diminishes the importance of titles in the provinces.

The direct costs to society which are incurred in the process of providing farmers with title documentation were recently estimated by Burns (1985), using data from the Thai Department of Lands. Those estimates are replicated in column 2 of Table 3. The cost to society of providing a full title does not exceed 5.6 percent of the market value of untitled land in any of the provinces studied. The calculation of the net social benefits (column 3) shows that even when farmers are assumed risk-averse, the net social benefit is substantial, ranging from 397 baht
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nakhon-Ratchasima</td>
<td>82.9</td>
<td>38.6</td>
<td>79.6</td>
<td>1448</td>
<td>2745</td>
<td>75.1</td>
</tr>
<tr>
<td>Khon-Kaen</td>
<td>80.5</td>
<td>42.1</td>
<td>77.0</td>
<td>1204</td>
<td>2667</td>
<td>23.0</td>
</tr>
<tr>
<td>Chaiyaphum</td>
<td>41.3</td>
<td>25.7</td>
<td>55.7</td>
<td>2014</td>
<td>119</td>
<td>7.4</td>
</tr>
<tr>
<td>Pooled Northeast Sample</td>
<td>68.2</td>
<td>35.1</td>
<td>64.1</td>
<td>2889</td>
<td>896</td>
<td>16.6</td>
</tr>
</tbody>
</table>
per rai in Chaiyaphum province, to 1276 baht per rai in Khon-Kaen province (i.e., from 20 to 39 percent of untitled land value, assuming risk aversion). The benefit/cost ratio for a policy of titling squatters ranges from 4.5 in Chaiyaphum to 12.0 in Khon-Kaen under the assumption of risk aversion.\(^1\) This implies that providing secure ownership (titles) to squatters generates an extremely high social rate of return.

The analysis above deals with the benefits of providing legal ownership (titles) to squatters on forest reserve land. The benefits would be smaller when title is awarded to occupiers of undocumented lands outside of the forest reserve, as in their case there is no significant deficiency in investment incentives. Rather, the lower productivity of such farmers stems from constrained access to institutional credit. The data show, however, that the market price of such land is much closer to the price of forest reserve land than it is to the price of titled land. It thus follows that the benefits to society from titling such undocumented land is still substantial, exceeding a benefit-cost ratio of 2 in the three northeastern provinces.

VII. Summary and Conclusions

The study reported in this paper provided a quantitative estimate of the impact of titles on economic performance, through the provision of state recognition and protection of ownership rights. It was shown that in

\(^1\) The benefit/cost ratio is calculated as the ratio of the discounted value of benefits to titling cost. A ratio of 1 indicates that the return to the project is exactly equal to that of other investments which are being undertaken.
most areas studied, titled farmers invest more than untitled farmers, undertake more land improvements, utilize more production inputs, and have a significantly higher productivity. The market value of titled land was shown to be significantly higher than that of untitled land of equal quality. A cost-benefit analysis has shown that the benefits to society generated by titling significantly outweigh the costs for three of the four provinces. The rate of return indicated by the calculations is several times higher than the standard return on public investments,

The implication of these results is that cadastres and titling can be very beneficial public investments, which should rank high among the priorities of governments. An assessment must be made, however, of the particular circumstances of the area or country where the investment is considered. A quantitative analysis of the type performed in the present study could be replicated in order to provide a well founded justification for investment in specific regions. As more quantitative information accumulates, with a wider regional coverage, regularities and patterns will emerge, which will make the task of assessing the urgency of investment in land registration systems easier.
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