Property Rights and Productivity: The Case of Joint Land Titling in Vietnam

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ABSTRACT. *This paper explores the effect of land titling on agricultural productivity in Vietnam and the productivity effects of single versus joint titling for husband and wife. Using a plot-fixed-effects approach our results show that obtaining a land title is associated with higher yields, for both individually and jointly held titles. We conclude that there is no trade-off between joint titling and productivity, and so joint titles are potentially an effective way to improve women's bargaining power within the household with no associated efficiency losses.* (JEL O12, O13)

I. INTRODUCTION

The assignment of land property rights has long been advocated as good policy for growth and poverty reduction. Securing property rights is expected to increase investment and improve land productivity. In particular, when land is scarce the formalization of land rights is seen as crucial. At the same time, empirical evidence of the effects of land property rights on investment and productivity has produced somewhat mixed results.[1] This suggests that the effects of land property rights are not a priori clear and therefore require case-specific analysis.[2]

Moreover, in most of the literature, the household is regarded as unitary and property rights to land are considered a household right. Where property rights are determined by land titling,[3] it may be the case that individual titling, where the land title is formally assigned to one household member, can have a different effect than joint titling, where more than one person formally owns the title to the land. This is of particular interest where both husband and wife are responsible for working the land, as in Vietnam, but only the husband formally owns the land title. Joint titling in this instance could change relative bargaining positions within the household. If household members have different preferences toward crop choices or risk behavior, or if they differ in terms of access to credit, the effects of the assignment of property rights through titling may vary depending on who owns the title.

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[1] For example, Goldstein and Udry (2008) and Besley (1995) find a positive impact of property rights on investment, while Chand and Yala (2009) find positive effects on productivity. In contrast, Carter, Wiebe, and Blarel (1994) and Brasselle, Gaspart, and Platteau (2002) provide evidence to suggest that no such positive association between property rights and investment or productivity exists. In addition, several empirical studies suggest that positive effects of property rights on investment, land yields, or credit are limited or depend on the institutional environment (Barslund and Tarp 2008; Bellemare 2013; Binswanger-Mkhize, Deininger, and Feder 1995; Carter and Olinto 2003; Migot-Adholla et al. 1991; Place and Hazell 1993; Place and Migot-Adholla 1998; Van Tassel 2004).

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[2] The effects of property rights may extend beyond productivity to include income, consumption, and other welfare measures. These are not considered in this paper, and so any implications drawn from the findings presented should take into account the fact that we cover only the productivity effect of titling.

[3] We use the term *property rights* as a general term that captures the various ways in which households and individuals can have rights to the land, including formal land titles and more informal types of tenure security. While the former is the focus of our analysis, the latter has also been given some attention in the literature. When we use the term *land titling* we are specifically referring to the existence of registered titles to land.

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In this paper we aim to contribute to the literature in two ways. First, we add to the empirical evidence on the impact of land titling on productivity outcomes by identifying a positive association between land titling and productivity using a household-plot panel dataset collected over a five-year period in Vietnam. The use of fixed-effects methodologies for the exploration of issues relating to the productivity of land in developing country contexts dates back to Bell (1977). He used a household-fixed-effects approach to examine the relationship between sharecropping and efficiency.[4] Recent developments in the literature, exploring more specifically the impact of property rights on outcomes, have extended this approach to consider, for example, spatial fixed effects (Goldstein and Udry 2008) and landlord-tenant paired fixed effects (Deininger, Ali, and Alemu 2011). While there are examples that use household-plot panel data of the kind we use here (see, e.g., Bellemare 2013; Deininger and Ali 2008; Holden, Deininger, and Ghebru 2009; Udry 1996), to our knowledge, there are no studies that have exploited within-plot variation in land titling over time to identify its effect on productivity.

Second, we investigate the extent to which there is treatment heterogeneity in the impact of land titling on productivity by considering the difference between individual and jointly held titles. There are few examples in the literature that address this issue. Joint titles have been proposed as a way of improving women's bargaining power within the household where introducing individual titles for women is not a feasible policy option (Unni 1999). As such, understanding the potential effect hereof on productivity will add an important dimension to this policy debate.

We use an extensive and rich data source that allows both within-household and within-plot variation to support the identification of the effect of titling on land productivity.[5] Over 2,000 households in 12 provinces in rural Vietnam were surveyed in 2006, 2008, and 2010 as part of the Vietnamese Access to Resources Household Survey. Along with demographic information on household members, we gather detailed information on access to and use of productive resources such as land, labor, and other inputs. Information on the characteristics of land and agricultural production are collected at the plot level, and plots are linked through successive rounds of the survey. Information on the registration of plots for land use rights (defined here as a land title) is gathered, and whether titles are individually or jointly held is also known.

In Vietnam, all land is "owned" by the people (i.e., all citizens) and is held in trust on their behalf by the national government. It has ceded control over use of the land to the provinces, which, in turn, have ceded control to districts, wards, and communes. On each level administration and control are exercised by the appropriate People's Committees. Farmers get individual "user rights" to operate the land through long-term leases, known as land use certificates (LUCs), or red books. The rules that govern land distribution have been reformed several times since the operation of land was decollectivized in 1988. Under the 1993 Land Law, individual LUCs were issued as proof of household claims to the plots cultivated, and farmers were given the right to exchange, transfer, lease, inherit, rent, and mortgage their land use rights.[6] LUCs were granted for a period of 20 years in the case of annual crops and for 50 years in the case of perennial crops. While farmers are legally required to register the land they operate, there are many plots of land that remain unregistered. For example, for agricultural land, rural households reported LUCs existed for 76.5% of plots in 2004 (Brandt 2006). Reform of the Land Law in 2003 aimed to improve the land registration system and provide clearer administrative procedures. However, according to our data, the proportion of plots registered

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[4] Bell (1977) examines the impact of sharecropping on efficiency rather than land titling. It is still, however, an important paper in this literature in that it was the first to use a household-fixed-effects approach in this context.

[5] In our sample there is within-household variation in the registration status of plots in 43% of cases and within-plot variation in registration status over time in 24% of cases.

[6] Do and Iyer (2003) provide an overview of land reforms in Vietnam. See also Luu et al. (2013).

with a LUC fell to under 70% by 2010.[7] Given that households register some but not all of the land they operate, coupled with the observation that the incidence of titling has declined over time due to many newly acquired plots remaining unregistered, using our plot-level data provides an interesting avenue to explore whether holding a LUC has an impact on land productivity.

In addition to offering new evidence on the impact of titling on productivity, we depart from previous literature on land titling in Vietnam by considering joint titling, which was introduced under the 2003 Land Law.[8] Prior to 2003 only one name, usually that of the household head, was recorded in the LUC. The 2003 reforms stipulated that LUCs should bear the names of two persons if the land is operated by both.[9] This change provides an opportunity to test whether joint titling affects productivity. We explicitly depart from the unitary household model and rely on plot-level variation over time within households to identify this effect.[10]

II. CONCEPTUAL FRAMEWORK

A large theoretical literature suggests that land titling may have beneficial effects on land productivity (Feder and Feeny 1991; Besley 1995; Binswanger-Mkhize, Deininger, and Feder 1995). Holding a title to the land will increase tenure security, which may incentivize farmers to put land to its most productive use. This could mean, for example,

growing longer-cycle crops, selling or renting land to more efficient farmers, or choosing higher-return fixed-term contracts as opposed to sharecropping contracts with tenants (Deininger and Jin 2008; Ravallion and van de Walle 2006; Bellemare 2012). Land titling also provides farmers with greater incentives to invest in land improvements with productive benefits in the long run (Hayes, Roth, and Zepeda 1997; Holden, Deininger, and Ghebru 2009; Gavian and Fafchamps 1996; Gebremedhin and Swinton 2003; Deininger and Jin 2006; Deininger et al. 2008). Farmers' willingness and ability to invest in land may furthermore be enhanced through increased access to credit when land becomes available as collateral.

Besley and Ghatak (2009) provide a simple theoretical exposition of the case for land titling. They also extend this model to consider the impact of individually held titles on an asset that two agents invest in. Their example relates to the incentives of a tenant to exert effort when the landlord, or owner of the property, can evict the tenant once the investment has been made. This model can also be interpreted in the context of joint versus single titling in the intrahousehold allocation of labor resources by husbands and wives that jointly work the land. If the title is also jointly held so that both husband and wife have equal rights to output from the land, the theoretical implications of Besley and Ghatak's (2009) model are that both the husband and wife will supply labor effort that will lead to a higher level of output than the case where only one household member is engaged in production.[11] If there are differences between the husband and wife in the entitlement to land, then we might expect a different outcome. If the husband exclusively holds the land title, he will have the ability to exclude the wife from the returns generated from the land. This will strengthen his bargaining power within

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[7] Without a LUC, plots cannot be formally transferred from one agent to another, neither through sales nor through inheritance. While it is possible to sell plots informally, this is at great risk to the buyer of the plot, and so this land is sold at a much lower price.

[8] See, for example, Pingali and Xuan (1992), Kompas et al. (2012), Do and Iyer (2003), Kemper, Klump, and Schumacher (2011), and Markussen, Tarp, and van den Broeck (2011).

[9] In most cases this change in the law implied that the name of both the household head and the spouse should appear on the LUC where they had joint ownership of the land. Where the married couple has separate assets the 2003 Land Law does not require that the names of both be included in the LUC.

[10] For further criticism of the unitary model see Udry (1996). He stressed the need for alternative models of intrahousehold resource allocations.

[11] The existence of decreasing returns to scale in effort makes it impossible for the husband to achieve this level of output working the land alone. However, if the wife is less productive than the husband, while overall household surplus will be higher with joint production and joint titling, the husband will receive a lower surplus if it is shared equally among husband and wife.

the household and reduce the decision-making power of the wife. Moreover, the wife will consider her best outside option as an alternative to supplying effort in the use of the land. In other words, when land titles are exclusively held by the husband, the threat of exclusion from returns to investment in production imply that the wife will make less of an effort in the production of output.[12] This will lead to lower levels of output and overall surplus.

This framework can be directly related to our study. The cultivation of rice in Vietnam is clearly a joint effort between men and women. It is common practice for men to take responsibility for activities such as plowing or transporting output to storage facilities. Women are more likely to be responsible for seeding, transplanting, or cutting at harvest time, even if these activities could be performed by men. Given the nature of rice production in Vietnam (see Paris et al. 2009), it is likely that land is more productive when both men and women supply effort into producing output. It is also possible that men could in principle exclude women from the production process, given that they could themselves feasibly undertake typically female activities. Our conceptual framework therefore fits quite well to the way in which rice is cultivated in Vietnam.

III. EMPIRICAL APPROACH

As outlined in Section II, our conceptual framework suggests that (1) titled land will be more productive than untitled land, and (2) where both husband and wife engage in production, joint titling will lead to more productive outcomes. In what follows, we explain the strategy that we use to test these hypotheses in terms of estimation and identification.

Estimation Strategy

The first model we estimate is a household-fixed-effects model of plot productivity that controls for the observed differences in plots

owned by the household, the time-varying characteristics of the household, and the unobserved time-invariant-household heterogeneity that could impact on productivity. This leads to the following model:

$$y_{ijt} = \beta_1 T_{ijt} + \mathbf{X}_{ijt}\boldsymbol{\beta}_2 + \mathbf{Z}_{jt}\boldsymbol{\beta}_3 + \varphi_j + \theta_t + \varepsilon_{1ijt}, \qquad [1]$$

where y_{ijt} is the productivity of plot i owned by household j in time t; T_{ijt} is an indicator variable of whether the household owns a land title to the plot; $\mathbf{X}_{ijt}$ is a vector of plot-specific characteristics (time varying and time invariant) that may have an impact on productivity; $\mathbf{Z}_{jt}$ is a vector of time-varying household characteristics; φ_j are household fixed effects; θ_t are year fixed effects; and ε_{1ijt} is a mean-zero error term.

The second model is a plot-fixed-effects model of plot productivity that controls for the unobserved differences in plot characteristics that may affect productivity and titling, as follows:

$$y_{ijt} = \delta_1 T_{ijt} + \mathbf{X}_{ijt}\boldsymbol{\delta}_2 + \mathbf{Z}_{jt}\boldsymbol{\delta}_3 + \eta_{ij} + \theta_t + \varepsilon_{2ijt}, \qquad [2]$$

where η_{ij} are plot-specific fixed effects and ε_{2ijt} is a mean-zero error term. In this model all time-invariant household-specific characteristics are absorbed by the plot-specific fixed effect, along with all time-invariant plot characteristics. This model has the advantage that most possible sources of unobserved heterogeneity are controlled for with the inclusion of the fixed-effects term, and the identification of δ_1 comes from the within-plot variation in titling status over time.

To examine the effect of joint versus individual titling we condition on land that is titled and estimate the following:

$$y_{ijt} = \alpha_1 JT_{ijt} + \mathbf{X}_{ijt}\boldsymbol{\alpha}_2 + \mathbf{Z}_{jt}\boldsymbol{\alpha}_3 + \eta_{ij} + \theta_t + \varepsilon_{3ijt}, \qquad [3]$$

where JT_{ijt} is an indicator variable that takes the value of one if the plot is jointly titled and ε_{3ijt} is a mean-zero error term.

Identification Strategy

Identifying a causal relationship between land titling and productivity is complicated by three possible sources of endogeneity: omitted

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[12] This is a version of Marshallian inefficiency whereby an agent implements less-than-optimal effort in response to not being full residual claimant on her output.

variable bias, measurement error, and simultaneity.

Omitted variable bias can result from unobserved heterogeneity that is correlated with both the productivity of the plot and the probability that the household registers the plot. This is problematic to the extent that $\mathbf{X}_{ijt}$ excludes important unobservable plot characteristics. To address this identification problem we exploit the tri-panel structure of our data (time, households, and plots). Using a household-fixed-effects model allows us to use the within-household variation in the LUC status of plots controlling for unobserved heterogeneity across households. Observed plot-specific characteristics, both time varying and time invariant, are included to control for differences across plots that may affect productivity. Our rich source of data allows us to include a wide range of plot characteristics as controls, each of which serves to reduce any potential omitted variable bias (see Section IV for details). Time-varying household characteristics are also included in the model, along with time fixed effects.

A key innovation here is that we also exploit the plot-panel dimension to our data. Accordingly, we use a plot-fixed-effects model that exploits the within-plot variation over time, allowing us to control for unobserved time-invariant plot characteristics that may affect both productivity and the LUC status of the plot, such as soil quality. The identification of the effect of the LUC, and its various name structures, on plot productivity comes from plots where the LUC status changes over time. We also explore the possibility that unobserved *time-varying* plot heterogeneity induces bias in the empirical section.

The second possible source of endogeneity bias could result from measurement error in the LUC status of a plot. For example, it may be that households misclassify whether a plot is individually titled or jointly titled. We perform a wide range of consistency checks on our data to ensure that this is not the case. During data collection a map of all plots owned and operated by the household is drawn, and the same map is used in each wave to ensure that the panel of plots can be matched. When questioned about the titling status of plots, households frequently produce

the LUC to aid the enumerators in establishing the registration status of each plot. As such we believe that the possibility for measurement error is very small.

The third possible source of endogeneity is reverse causality or simultaneity whereby the productivity of the plot influences the household's decision to register the plot as opposed to the registration status of the plot leading to productivity improvements. Deininger and Jin (2006), for example, argue that if investments can be made that enhance tenure security, then it may appear that tenure insecurity leads to higher levels of output-related investment (or effort). In this case tenure security would be endogenously determined.[13] In our case, tenure security is defined by whether a farmer has a formal LUC, and so investments in land will not be confounded with investments in securing the title.[14] Clearly, whether a household holds a land title may be affected by other factors related to the characteristics of the land, and we allow for this in our empirical model, as discussed above.

A further consideration in the estimation of the impact of LUC status on productivity is the extent to which the stable unit treatment value assumption (SUTVA) holds (Rubin 1980). This assumption is required for unbiased estimates of the treatment effect, which in this case is the registration status of the plot. For this assumption to hold, the treatment applied to one subject should not affect the outcome of the other subjects and is analogous to the strict exogeneity assumption required for the unbiasedness of the fixed-effects estimator. Crucial in this context is the unit of observation used to identify the treatment effect.

There are two ways in which this assumption could be violated. First, the titling of land could be correlated with unobserved plot-specific characteristics in other time periods. This could be the case in both the household- and

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[13] See also Holden and Yohannes (2002), for example.

[14] Obtaining a LUC involves a small cost to the individual/household. To have a LUC issued, farmers must pay a fee of approximately 20,000 Vietnamese dong (approximately $1.25 at the time the law was passed). Fee exemptions are often offered to increase registration in, for example, remote regions. See Do and Iyer (2008) for further details.

plot-fixed-effects models. Second, in the case of the household-fixed-effects model the titling of land could be correlated with the unobserved plot-specific characteristics of other plots within the household. To test the first possibility we include a lead of the main variable (LUC) in both the household- and plot-fixed-effects regression models. To test the second possibility we include a household-level indicator variable in the household-fixed-effects model that allows us to see whether the productivity of untitled plots within the household are impacted by the household having a LUC for other plots within the household. In all cases these variables are found to have a statistically insignificant effect, suggesting that the SUTVA and strict exogeneity assumptions hold.[15]

IV. DATA AND DESCRIPTIVE STATISTICS

Data were gathered in three rounds of the Vietnam Access to Resources Household Survey, implemented in 2006, 2008, and 2010 in 12 provinces in Vietnam.[16] The households for which a full panel is available are spread over 456 communes and 131 districts, and they total approximately 2,200. They are representative of the population of rural households living in the provinces surveyed. We gather demographic information on households and their members and also detailed information on agricultural production and land use at the plot level. Households and plots are linked through successive rounds of the survey, allowing us to construct an extensive household and plot panel dataset.

We focus our analysis on plots that have been cultivated with rice in the most recent season. Rice is the most commonly grown crop in Vietnam.[17] The panel of rice-growing plots constructed for this analysis includes over 16,000 observations on approximately 7,500 rice plots.[18] Plot-level data include information on the size and quality of the plot, its slope and irrigation infrastructure, when and how the plot was acquired, whether the household has a LUC for the plot, and whose name(s) appears in the LUC. Furthermore, information exists on which crops are grown on each plot and, for rice only, the amount of output during the three last agricultural seasons per plot.

In Table 1 we show the proportion of plots with a LUC in the surveyed households in each year, decomposed by the name structure in the LUC. Focusing on rice plots, LUCs are held for 77% of plots, but for the most part, only one household name is written in the LUC (87%). In only 7% of cases are both the husband's and the wife's names in the LUC. The proportion of rice plots with a LUC declined over time from 90% in 2006 to only 67% in 2010. This decline is, for the most part, due to households acquiring new plots and either not registering them in the LUC or experiencing delays in the registration process.[19] Between 2006 and 2008 6% of existing plots changed registration status, while between 2008 and 2010 changes were reported in 11% of plots.

Table 2 presents a summary of plot characteristics by registration status of the plot. Plots with a LUC are smaller, located closer to the house, more likely to share a border with other plots, more likely to be flat-sloped, and more likely to be irrigated. In general, the characteristics of plots with a LUC appear to

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[15] Results are available on request.

[16] The survey was developed in collaboration between the Development Economics Research Group (DERG), Department of Economics, University of Copenhagen, and the Central Institute of Economic Management (CIEM), the Institute for Labor Studies and Social Affairs (ILSSA), and the Institute of Policy and Strategy for Agriculture and Rural Development (IPSARD), Hanoi, Vietnam.

[17] This long tradition of rice growing is ensured in part by government national food security considerations. More recently foreign-exchange generation also plays a role, considering the importance of rice in Vietnam's exports.

[18] We acknowledge that by focusing on rice plots we are dealing with a selected sample. There is, however, no evidence to suggest that titling is more common for rice plots compared with other plots, and so the use of rice plots only in our analysis is not expected to induce any bias in our estimates. Care should be taken, however, not to generalize our findings to other types of crop production.

[19] In the 2010 questionnaire we asked households the reason why they did not have a LUC. We found that delays in the registration process accounted for 18% of unregistered plots.

TABLE 1

LUC Situation of Plots

	All Plots		Rice Plots[a]		2006	2008	2010
	Observations	%	Observations	%	%	%	%
Total plots	32,436		16,244				
No LUC	9,262	28.6	3,690	24.7	9.8	21.8	33.3
With LUC	23,174	71.4	12,554	77.3	90.2	78.2	66.7
No HH names	1,508	6.6	707	5.7	4.5	8.0	4.0
One HH name	19,501	84.9	10,869	87.1	87.8	85.6	88.4
Two HH names	1,965	8.6	900	7.2	7.8	6.4	7.6
Husband and wife	1,816	8.5	825	7.0	7.3	6.5	7.3
Changes in LUC[b]	2,163	6.1	950	6.3	—	5.9	11.3

Note: HH, household head; LUC, land use certificate.

[a] These are plots where rice was grown in the most recent agricultural season.

[b] Changes in LUC status (i.e., from having a LUC to not having one, or the other way around) either between 2006 and 2008 or between 2008 and 2010.

TABLE 2

Characteristics of Plots, by LUC

			Of Plots with LUC					
	No LUC	LUC	No HH Names	One HH Name	Two HH Names	2006	2008	2010
Distance to house (m)	1,936	917	1,105	885	1,139	949	1,217	1,213
Plot size (m^2)	1,890	1,107	1,061	1,094	1,295	1,069	1,363	1,364
Share border (%)	9.3	12.8	12.6	12.1	21.6	14.3	11.1	11.1
Not state acquired (%)	64.6	21.8	44.8	18.7	39.0	22.1	37.1	38.8
Acquired < 1993 (%)	36.6	65.6	55.3	66.3	66.8	62.4	55.9	53.7
Acquired 1993–2003 (%)	36.0	30.3	31.3	30.6	25.3	31.7	31.0	31.8
Acquired ≥ 2003 (%)	27.4	4.0	13.4	3.0	7.9	5.8	13.1	14.5
Irrigated (%)	59.0	88.4	83.6	88.5	92.2	86.7	80.0	81.3
Restricted crop choice (%)	26.5	59.8	58.9	60.4	53.0	71.3	53.5	38.1
Slope, flat (%)	49.5	78.6	76.3	80.5	59.6	74.7	73.8	69.8
Slope, slight (%)	26.0	16.9	17.7	15.4	34.3	16.8	18.5	20.2
Slope, moderate (%)	23.7	4.1	5.8	3.8	5.5	7.9	7.3	9.6
Slope, steep (%)	0.8	0.3	0.1	0.3	0.6	0.6	0.3	0.3
Number of plots	3,690	12,554	707	10,869	900	4,496	6,363	6,125

Note: Characteristics of plots where rice was grown in the most recent agricultural season. HH, household head; LUC, land use certificate.

be more favorable for growing rice. Also of note is that plots with a LUC are more likely to be allocated to the household by the state or commune rather than being inherited or purchased. They are also more likely to have restrictions placed by the state on the choice of crops that can be produced.[20] Table 2 also suggests that plots with a LUC are more likely

to have been acquired before 1993 compared to the plots without a LUC.

Conditional on having a LUC, the characteristics of plots also appear to differ according to the number of household members named in the LUC. Comparing plots registered with one and two household members, nearly all plot characteristics are significantly different: plots with a LUC bearing two names are larger and further away from the house and are less likely to have a flat slope. They are also less likely to have been acquired by the state or commune. Consistent with the law

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[20] Markussen, Tarp, and van den Broeck (2011) explore the effect of restrictions on land use (i.e., an obligation to grow rice) and find that while such restrictions are binding and affect household labor supply decisions, they have no effect on income from cultivation.

TABLE 3
Average and Median Rice Yield, by LUC Situation of Plot

	Pooled		2006		2008		2010	
	Avg. (kg/m²)	Median (kg/m²)	Avg. (kg/m²)	Median (kg/m²)	Avg. (kg/m²)	Median (kg/m²)	Avg. (kg/m²)	Median (kg/m²)
All plots	0.49	0.47	0.55	0.48	0.50	0.50	0.44	0.44
No LUC	0.42	0.40	0.52	0.43	0.45	0.40	0.37	0.40
With LUC	0.51	0.49	0.55	0.48	0.51	0.50	0.47	0.47
LUC on which:								
Zero HH names	0.53	0.45	0.72	0.42	0.48	0.50	0.43	0.43
One HH names	0.51	0.49	0.55	0.48	0.51	0.50	0.48	0.47
Two HH names	0.50	0.43	0.54	0.42	0.48	0.42	0.46	0.45
Husband and wife	0.49	0.43	0.54	0.41	0.48	0.42	0.46	0.45

Note: Characteristics of plots where rice is grown in the most recent agricultural season. HH, household head; LUC, land use certificate.

change in 2003, we find that plots with a LUC with two household member names are more likely to have been acquired after 2003 compared with plots with a LUC with one name. The proportion of plots with two names, however, is very low.

Table 3 examines average and median rice yields of plots disaggregated by their LUC status. In general, the average and median rice yields are around half a kilo per square meter. In all cases we find that plots with a LUC are more productive than plots without. This is not surprising given the differences in the characteristics of plots with and without a LUC, presented in Table 2. Plots with a LUC with two names are also more productive than plots without a LUC but are less productive than plots with one name registered.

The descriptive statistics presented in this section suggest that there are differences between plots that have land titles and those that do not, both in terms of the characteristics of the plots and rice yields. There are also differences in plot characteristics and yields depending on the name structure in the LUC. Our empirical investigation allows us to explore the effect of LUC registration on productivity controlling for these differences, including observed and unobserved plot and household characteristics.[21]

V. EMPIRICAL RESULTS

We begin by considering whether land titles have an impact on agricultural productivity. We first estimate the household-fixed-effects model given in equation [1]. The full list of variables used in the analysis is given in Table 4.[22]

The results for the household-fixed-effects model are presented in column (2) of Table 5, with ordinary least squares (OLS) results presented in column (1) for comparison. The results reveal that, within households, plots with a LUC produce higher rice yields. This is the case even when controlling for a variety of plot characteristics and time-varying household characteristics.

Next we use a plot-fixed-effects model that exploits the within-plot variation over time, allowing us to control for unobserved time-invariant plot characteristics that may affect both productivity and the LUC status of the plot. As such, the identification of the effect of the LUC and its various name structures on plot productivity comes from plots where the LUC status changes over time.

The results are presented in Table 6. As revealed in column (1) we find that obtaining a LUC for a plot has a positive and significant effect on rice yields. Given that the

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[21] Reliable data on female labor supply and capital investment at the plot level are not available, preventing us from disentangling the possible mechanisms underlying the relationship between land titling and productivity.

[22] We also estimate each model using a range of controls for inputs. Our results are not affected. The results are not presented here but are available on request.

TABLE 4
Variable Descriptions

	Description
Dependent Variable	
Log rice yields	Log of rice output in the last full season/size of the plot in meters squared
Plot Characteristics	
Distance to dwelling	Distance from residence to plot in meters/100
Area	Area of the plot in square meters
Borders another plot	Dummy indicator for whether the plot borders another plot owned by the HH
Flat slope	Dummy indicator for plot with a flat slope (base category for slopes)
Slight slope	Dummy indicator for plot with a slight slope
Moderate slope	Dummy indicator for plot with a moderate slope
Steep slope	Dummy indicator for plot with a steep slope
Irrigated	Dummy indicator for whether the plot is irrigated
Restrictions	Dummy indicator for whether there are restrictions on the type of crop grown
Acquired by nonstate means	Dummy indicator for plots that are acquired through the market, inherited, or cleared and occupied
Land Titling Variables	
LUC	Dummy indicator for plot with a LUC (base category: no LUC)
Two household names	Dummy indicator for plot with two HH members named in the LUC
One household name	Dummy indicator for plot with one HH member named in the LUC
No household names	Dummy indicator for plot with no HH members named in the LUC
Two names	Dummy indicator for plot with two names in the LUC
Husband's and wife's names	Dummy indicatory for plot with both husband's and wife's name in the LUC
Household Characteristics	
Sex head	Dummy indicator for gender of the HH (= 1 if male)
Age head	Age of the head of household
Ed1	Dummy indicator for HH cannot read and write
Ed2	Dummy indicator for HH can read and write but did not complete secondary school
Ed3	Dummy indicator for HH completed primary school
Ed4	Dummy indicator for HH completed lower secondary school
Ed5	Dummy indicator for HH completed upper secondary school
Ed6	Dummy indicator for HH has third level qualification
HHsize	Number of productive household members

Note: HH, household head; LUC, land use certificate.

dependent variable is the log of rice yields and the independent variable is a dummy variable, a transformation, such as that proposed by Kennedy (1981), is required to recover the marginal effect. The percentage impact on yields of moving from not having a LUC to having a LUC is computed as $[\exp(\hat{\delta}_1)/\exp(0.5\hat{V}(\hat{\delta}_1))] - 1$, where $\hat{\delta}_1$ is the parameter estimate of δ_1 from equation [2]

and $\hat{V}(\hat{\delta}_1)$ is the estimate of the variance of $\hat{\delta}_1$. Applying this formula yields a marginal effect of 0.049. This suggests that plots that move from not having a LUC to having a LUC experience gains in rice yields of 4.9%.

The use of plot fixed effects goes some way toward controlling for possible sources of endogeneity. There is a possibility that unob-

TABLE 5
Household-Level Models

Plot Characteristics (Dependent Variable: Log rice yields)	(1) OLS	(2) OLS FE
LUC	0.066*** (0.016)	0.056*** (0.019)
Distance to dwelling	−0.000*** (0.000)	−0.000* (0.000)
Area	−0.000*** (0.000)	−0.000*** (0.000)
Borders another plot	−0.053** (0.022)	−0.027 (0.023)
Slight slope	−0.136*** (0.015)	−0.034** (0.016)
Moderate slope	−0.231*** (0.031)	−0.040 (0.035)
Steep slope	−0.077 (0.116)	−0.030 (0.087)
Irrigated	0.189*** (0.019)	0.113*** (0.021)
Restricted to growing rice	0.001 (0.012)	−0.051*** (0.014)
Acquired by nonstate means	0.012 (0.020)	−0.027 (0.029)
Household characteristics	Yes	Yes
Household fixed effects	No	Yes
Year 2008	0.029** (0.013)	0.024* (0.012)
Year 2010	−0.029** (0.013)	−0.043*** (0.013)
Observations	15,972	15,972
Number of households	2,249	2,249

Note: Standard errors clustered at the household level are presented in parentheses. Time-varying household characteristics are also included in the model, but none are found to be statistically significant in the fixed-effects model and so are not presented. Results are available on request. LUC, land use certificate; OLS, ordinary least squares; OLS FE, ordinary least squares fixed effects.
    * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

TABLE 6
Plot-Fixed-Effects Regression Models

LUC Status (Dependent Variable: Log rice yields)	(1) Full Sample	(2) Full Sample	(3) Conditional on LUC	(4) Conditional on LUC
LUC	0.048** (0.022)			
Two household names		0.070** (0.030)		
One household name		0.045** (0.023)		
No household names		0.045 (0.033)		
Two names			0.018 (0.026)	
Husband's and wife's names				0.007 (0.026)
Plot characteristics	Yes	Yes	Yes	Yes
Household characteristics	Yes	Yes	Yes	Yes
Year 2008	0.017 (0.012)	0.018 (0.012)	0.011 (0.013)	0.011 (0.014)
Year 2010	−0.036*** (0.013)	−0.035*** (0.013)	−0.018 (0.014)	−0.014 (0.016)
Constant	−1.039*** (0.115)	−1.045*** (0.116)	−1.027*** (0.142)	−0.963*** (0.194)
Observations	15,975	15,900	12,257	11,556
R-squared	0.020	0.020	0.012	0.012
Number of plots	7,246	7,238	5,788	5,610

Note: Standard errors clustered at the household level are presented in parentheses. Results for time-varying plot and household controls are available on request. LUC, land use certificate.
    ** $p < 0.05$; *** $p < 0.01$.

served time-varying plot-specific factors in-fluence plot productivity and the probability of the plot being titled, for example, natural disasters or a new infrastructural project. We check the robustness of our results to the in-clusion of a control for plot-specific natural disasters, and they remain unchanged. We also estimate our model excluding communes with recent large infrastructural projects, and the results remain the same.[23]

Finally, we explore how the name structure in the LUC impacts productivity. This is con-ducted within the context of the plot-fixed-effects analysis. Our first step is to explore whether the number of household names in the LUC has an impact on yields. In place of the single dummy variable for having a LUC, we consider four categories of LUC status: whether the LUC has two household names (in most cases the household members are the husband and wife); whether the LUC has one household name; whether the plot has a LUC but there are no household names listed; and plots that have no LUC (base category). Each category is mutually exclusive, and the first three categories are included as separate dummy variables in the analysis. The coeffi-cients on each of these variables should be interpreted relative to the base category of not having a LUC. The results are presented in column (2) of Table 6.

The coefficients on the variables "two household names" and "one household name" are positive and statistically significant, which means that relative to the base category of not having a LUC, these plots have higher yields. There is no significant difference in yields for plots that move from having no LUC to hav-ing a LUC but with no household names. This suggests that obtaining a LUC has productiv-ity enhancing effects regardless of the name structure, as long as household names are in-cluded in the LUC. It is of interest to note that the magnitude of the coefficient is largest for plots with two household names (i.e., joint ti-tling), suggesting that relative to not holding a title (the base category), holding a title in

two names has greater productivity effects than holding a title in one name.

To explore joint titling further we restrict our sample to plots that have a LUC and ex-amine whether changes in the name structure have an effect on rice yields. The results are presented in columns (3) and (4) of Table 6. We find that once we condition on having a LUC, registering two names as opposed to one name does not have any significant effect on productivity. The same holds for titles jointly held by husband and wife. So while the magnitude of the effect of having a LUC on productivity appears higher for jointly held titles than individual titles, as revealed in col-umn (2), this difference is not statistically sig-nificant. Nevertheless we can still conclude that titling has a positive impact on productiv-ity for both individually held and jointly held titles.

In Section II, we proposed female effort as a main channel through which joint titling im-pacts on productivity. There could also be other underlying mechanisms such as in-creased levels of investment on jointly titled plots. It would be interesting to explore em-pirically which of these channels is at work. Unfortunately, our data do not permit a rig-orous plot-level analysis of the impact of ti-tling on female labor supply or investment. Tentative evidence based on the limited avail-able data suggests that titling, and joint titling in particular, increases the likelihood of a plot being managed by a female household mem-ber, but has no effect on investment.[24]

As a final test for differential effects on productivity of joint versus single titles we re-strict our sample to plots acquired since 2003 to examine the effect of joint titling on eligible plots.[25] The results are presented in Table 7. Overall we find that for plots acquired since 2003, obtaining a LUC does not appear to have any effect on the productivity of the plot (columns (1) and (2)). Moreover, once we

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[23] Since we have these data for only 2008 and 2010, we do not present the results here, but they are available on request.

[24] Plot-level information on female labor supply and capital investment were poorly answered by survey respon-dents, and so this analysis is based on a reduced and selected sample. Moreover, these data were collected only in the 2008 and 2010 survey rounds. The results are not presented but are available on request.

[25] While households can reregister plots in order to ob-tain joint titles, this is rare.

TABLE 7
Plot-Fixed-Effects Regression Models for Plots Acquired since 2003

LUC Status (Dependent Variable: Log rice yields)	(1) Full Sample	(2) Full Sample	(3) Conditional on LUC	(4) Conditional on LUC
LUC	0.003			
	(0.054)			
Two household names		0.067		
		(0.101)		
One household name		0.002		
		(0.060)		
No household names		−0.016		
		(0.070)		
Two names			0.124	
			(0.099)	
Husband's and wife's names				0.165
				(0.126)
Plot characteristics	Yes	Yes	Yes	Yes
Household characteristics	Yes	Yes	Yes	Yes
Year 2008	0.022	0.037	−0.053	−0.018
	(0.044)	(0.051)	(0.077)	(0.088)
Year 2010	−0.161***	−0.148***	−0.309***	−0.307***
	(0.043)	(0.047)	(0.103)	(0.104)
Constant	−0.928***	−0.937***	−2.010**	−2.111**
	(0.181)	(0.187)	(0.959)	(1.090)
Observations	1,516	1,506	495	401
R-squared	0.164	0.164	0.194	0.272
Number of plots	830	828	292	254

Note: Standard errors clustered at the household level are presented in parentheses. Results for time-varying plot and household controls are available on request. LUC, land use certificate.

** $p < 0.05$; *** $p < 0.01$.

condition on plots that are registered, we find no impact of the naming structure of the LUC on rice yields.

In sum, while we do not find causal evidence to confirm that joint titling leads to greater productivity effects than individually held titles, we can clearly conclude that there is no negative effect of joint titling on productivity. This is important when considering policies aimed at promoting gender equality in the titling of land. Joint titling has been proposed as a mechanism for empowering women (Unni 1999). There are potentially large developmental benefits from doing so, given the extensive literature linking the empowerment of women with broader welfare outcomes (Duflo 2012). Further research is needed to ascertain whether causal links can be made between joint titling and other outcomes through the empowerment channel. Nevertheless, our finding that joint titling does not lead to disincentive effects that might negatively affect the productivity of land, at least in the case of Vietnam, make it a viable policy instrument for achieving gender equality as a desirable goal for its own sake.

VI. CONCLUSION

In this study, we used an extensive household-plot panel dataset, collected in three waves (2006, 2008, and 2010) in 12 provinces in Vietnam, to explore the effect of land titles on rice yields. Importantly, the dataset allows us to use both household- and plot-fixed-effects analytical models. Much of the previous literature in this field treats the household as the unit of analysis, ignoring the possibility that the effect of land titling may differ depending on the exact naming structure of the title. Our data and approach make it possible to separately identify the effect of individual versus joint titling on productivity.

Our empirical results confirm that holding a LUC, the official document of a household's long-term entitlement to the use of land, is

positively associated with plot-level rice yields. This suggests that the assignment of land titles is likely to matter for productivity. This is based on plot-fixed-effects regression analysis that controls for time-invariant heterogeneity in plot characteristics that could confound the observed effect. We find productivity-enhancing effects associated with both single and jointly held titles but do not find evidence that joint titling has greater effects on productivity than individually held titles.

For Vietnam, our findings suggest that policy efforts should be intensified to ensure that untitled plots and newly acquired plots are registered. Anecdotal evidence suggests that the main reason that plots are not registered is administrative delay. Moreover, our data show that the majority of unregistered plots are ones that previously did not belong to anybody and were cleared by the household for agricultural use. There are several reasons why households might not register these plots. For example, the new land holding might take them above the ceiling of allowable annual crops land (2 to 3 ha, depending on the province). The 2013 Land Law, to be introduced in the middle of 2014, will lift this ceiling and so may increase the rate of plot registration.

This is put in broader perspective by noting that households who do not have any of their plots protected with LUCs are typically ethnic minorities, the poorest, and the most remote. While we cannot say empirically why these households in particular are less likely to hold land titles, anecdotal evidence suggests that it is due to factors such as a lack of information, lower levels of literacy among these groups, and physical distance from land registration offices. The fact that government land-planning frameworks are less well developed in remote areas may also play a role. As such, efforts to improve the certification process for these groups are expected to have distributional consequences. Moreover, arguably, the process of issuing joint titles for land should be continued and even stepped up where joint rights are appropriate. There is at least no trade-off with productivity for doing so.

This study is also of relevance to other developing countries where the security of land tenure is in question for smallholder farms, by highlighting the potential for land titling to have productivity-enhancing effects. We provided new evidence to suggest that it is necessary to go beyond the assumption of the unitary household when analyzing land titling in certain contexts. Joint titles have often been proposed as a way of improving women's bargaining power within the household where introducing individual titles for women is not a feasible policy option. As such, joint titling has the potential for impact on broader welfare outcomes for women and their families. Our results indicate that such a policy will not have any negative consequences for the productivity of land.

Acknowledgments

References

Barslund, Mikkel, and Finn Tarp. 2008. "Formal and Informal Rural Credit in Four Provinces of Vietnam." *Journal of Development Studies* 44 (4): 485–503.

Bell, Clive. 1977. "Alternative Theories for Sharecropping: Some Tests Using Evidence from Northeast India." *Journal of Development Studies* 13 (4): 317–46.

Bellemare, Marc. 2012. "Insecure Land Rights and Share Tenancy: Evidence from Madagascar." *Land Economics* 88 (1): 155–80.

———. 2013. "The Productivity Impacts of Formal and Informal Land Rights: Evidence from Madagascar." *Land Economics* 89 (2): 272–90.

Besley, Timothy. 1995. "Property Rights and Investment Incentives: Theory and Evidence from Ghana." *Journal of Political Economy* 103 (5): 903–37.

Besley, Timothy, and Maitreesh Ghatak. 2009. "Property Rights and Economic Development." In

Handbook of Development Economics, ed. Dani Rodrik and Marc Rosenzweig. Amsterdam: Elsevier.

Binswanger-Mkhize, Hans P., Klaus Deininger, and Gershon Feder. 1995. "Power, Distortions, Revolt and Reform in Agricultural Land Relations." In *Handbook of Development Economics,* ed. Jere Richard Behrman and T. N. Srinivasan. Amsterdam: Elsevier.

Brandt, Loren. 2006. *Land Access, Land Markets and Their Distributive Implications in Rural Vietnam.* Summary Report. Toronto: Department of Economics, University of Toronto.

Brasselle, Anne-Sophie, Frederic Gaspart, and Jean-Philippe Platteau. 2002. "Land Tenure Security and Investment Incentives: Puzzling Evidence from Burkina Faso." *Journal of Development Economics* 67 (2): 373–418.

Carter, Michael, and Pedro Olinto. 2003. "Getting Institutions 'Right' for Whom? Credit Constraints and the Impact of Property Rights on the Quantity and Composition of Investment." *American Journal of Agricultural Economics* 85 (1): 173–86.

Carter, Michael, Keith Daniel Wiebe, and Benoit Blarel. 1994. "Tenure Security for Whom? Differential Effects of Land Policy in Kenya." In *Searching for Land Tenure Security in Africa,* ed. John Bruce and Shem E. Migot-Adholla. Dubuque, IA: Kendall/Hunt.

Chand, Satish, and Charles Yala. 2009. "Land Tenure and Productivity: Farm-level Evidence from Papua New Guinea." *Land Economics* 85 (3): 442–53.

Deininger, Klaus, and Daniel Ayalew Ali. 2008. "Do Overlapping Land Rights Reduce Agricultural Investment? Evidence from Uganda." *American Journal of Agricultural Economics* 90 (4): 869–82.

Deininger, Klaus, Daniel Ayalew Ali, and Tekie Alemu. 2011. "Productivity Effects of Land Rental Markets in Ethiopia: Evidence from a Matched Tenant-Landlord Sample." Policy Research Working Paper 5727. Washington, DC: World Bank.

Deininger, Klaus, Daniel Ayalew Ali, Stein Holden, and Jaap Zevenbergen. 2008. "Rural Land Certification in Ethiopia: Process, Initial Impact, and Implications for other African Countries." *World Development* 36 (10): 1786–1812.

Deininger, Klaus, and Songqing Jin. 2006. "Tenure Security and Land-Related Investment: Evidence from Ethiopia." *European Economic Review* 50 (5): 1245–77.

———. 2008. "Land Sales and Rental Markets in Transition: Evidence from Rural Vietnam." *Oxford Bulletin of Economics and Statistics* 70 (1): 67–101.

Do, Quy-Toan, and Lakshmi Iyer. 2003. "Land Rights and Economic Development: Evidence from Vietnam." Policy Research Working Paper 3120. Washington, DC: World Bank.

Duflo, Esther. 2012. "Women's Empowerment and Economic Development." *Journal of Economic Literature* 50 (4): 1051–79.

Feder, Gershon, and David Feeny. 1991. "Land Tenure and Property Rights: Theory and Implications for Development Policy." *World Bank Economic Review* 5 (1): 135–53.

Gavian, Sarah, and Marcel Fafchamps. 1996. "Land Tenure and Allocative Efficiency in Niger." *American Journal of Agricultural Economics* 78 (2): 460–71.

Gebremedhin, Berhanu, and Scott M. Swinton. 2003. "Investment in Soil Conservation in Northern Ethiopia: The Role of Land Tenure Security and Public Programs." *Agricultural Economics* 29 (1): 69–84.

Goldstein, Markus, and Christopher Udry. 2008. "The Profits of Power: Land Rights and Agricultural Investment in Ghana." *Journal of Political Economy* 116 (6): 981–1022.

Hayes, Joseph, Michael Roth, and Lydia Zepeda. 1997. "Tenure Security, Investment and Productivity in Gambian Agriculture: A Generalized Probit Analysis." *American Journal of Agricultural Economics* 79 (2): 369–82.

Holden, Stein, Klaus Deininger, and Hosaena Hagos Ghebru. 2009. "Impacts of Low-Cost Land Certification on Investment and Productivity." *American Journal of Agricultural Economics* 91 (2): 359–73.

Holden, Stein, and Hailu Yohannes. 2002. "Land Redistribution, Tenure Insecurity, and Intensity of Production: A Study of Farm Households in Southern Ethiopia." *Land Economics* 78 (4): 573–90.

Kemper, Niels, Rainer Klump, and Heiner Schumacher. 2011. "Representation of Property Rights and Credit Market Outcomes: Evidence from a Land Reform in Vietnam." In *Proceedings of the German Development Economics Conference,* Number 45. Berlin: Verein für Socialpolitik.

Kennedy, Peter E. 1981. "Estimation with Correctly Interpreted Dummy Variables in Semilogarithmic Equations." *American Economic Review* 71 (4): 801.

Kompas, Tom, Tuong Nhu Che, Hoa Thi Minh Nguyen, and Ha Quang Nguyen. 2012. "Productivity, Net Returns, and Efficiency: Land and Market Reform in Vietnamese Rice Production." *Land Economics* 88 (3): 478–95.

Luu, Duc Khai, Thomas Markussen, Simon McCoy, and Finn Tarp. 2013. "Access to Land: Market and Non-market Land Transactions in Rural Vietnam."

In *Land Tenure Reforms in Asia and Africa: Assessing Impacts on Poverty and Natural Resource Management,* ed. Stein Holden, Keijiro Otsuka, and Klaus Deininger, 162–86. New York: Palgrave Macmillan.

Markussen, Thomas, Finn Tarp, and Katleen van den Broeck. 2011. "The Forgotten Property Rights: Evidence on Land Use Rights in Vietnam." *World Development* 39 (5): 839–50.

Migot-Adholla, Shem, Peter Hazell, Benoit Blarel, and Frank Place. 1991. "Indigenous Land Rights Systems in Sub-Saharan Africa: A Constraint on Productivity?" *World Bank Economic Review* 5 (1): 155–75.

Paris, Thelma, Maria Fay Rola-Rubzen, Joyce Luis, Truong Thi Ngoc Chi, Chaicharn Wongsanum, and Donald Villanueva. 2009. "Labour Out Migration on Rice Farming Households and Gender Roles: Synthesis of Findings in Thailand, the Philippines and Vietnam." Paper presented at the FAO-IFAD-ILO Workshop on Gaps, Trends and Current Research in Gender Dimensions of Agricultural and Rural Employment: Differentiated Pathways Out of Poverty, Rome.

Pingali, Prabhu L., and Vo-Tong Xuan. 1992. "Decollectivisation and Rice Productivity Growth." *Economic Development and Cultural Change* 40 (4): 697–718.

Place, Frank, and Peter Hazell. 1993. "Productivity Effects of Indigenous Land Tenure Systems in Sub-Saharan Africa." *American Journal of Agricultural Economics* 75 (1): 10–19.

Place, Frank, and Shem Migot-Adholla. 1998. "The Economic Effects of Land Registration on Smallholder Farms in Kenya: Evidence from Nyeri and Kakamega Districts." *Land Economics* 74 (3): 360–73.

Ravallion, Martin, and Dominique van de Walle. 2006. "Land Allocation in an Agrarian Transition." *Economic Journal* 116 (514): 924–42.

Rubin, Donald. 1980. "Comment." (Badu, D. "Randomization Analysis of Experimental Data: The Fisher-Randomization Test.") *Journal of the American Statistical Association* 75 (371): 591–93.

Udry, Christopher. 1996. "Gender, Agricultural Production, and the Theory of the Household." *Journal of Political Economy* 104 (5): 1010–46.

Unni, Jeemol. 1999. "Property Rights for Women: Case for Joint Titles to Agricultural Land and Urban Housing." *Economic and Political Weekly* 34 (21): 1281–86.

Van Tassel, Eric. 2004. "Credit Access and Transferable Land Rights." *Oxford Economic Papers* 56 (1): 151–66.