WOMEN'S LAND TITLE OWNERSHIP AND EMPOWERMENT: EVIDENCE FROM INDIA

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ABSTRACT

This paper examines how women's participation in family decision-making is affected by land rights in rural areas in India. The 2005 Hindu Succession Act was legislated to protect women's rights to an equal share in ancestral property, including land. Using a unique rural household survey from Eastern Uttar Pradesh, Bihar, Odisha, and West Bengal where female enumerators were employed to interview female participants, we find that only 3% of the 8,000 rural households randomly selected in those four states have their land registered under women's names. Controlling for the potential endogeneity of land title ownership, we find that women's land title ownership has positive effects on their participation in decisions about farming, livelihood, and household activities. Using state level-disaggregated data, however, we find that the signs and magnitudes of the impacts differ across the four states whose social and economic norms are diverse.

Keywords: decision-making, gender, India, women's land rights

JEL codes: D63, Q15

I. INTRODUCTION

Gender equity has been the centerpiece of inheritance law, but gender bias persists, and inequalities in succession law proliferate for land rights in developing countries. The existence of bias against women's land ownership can constitute a serious limitation for their status in the family and society and their economic and professional choices. It can also deprive rural women of their incentives and capacity to invest in agricultural production, impacting negatively on their earnings and limiting their participation or influence in family activities or decisions (Roy and Tisdell 2002). Moreover, the absence of land ownership by women affects their social status, imposing the patriarchal views stringently and women's status is low within the social strata and within their family (Roy 2008). Thus, land rights equity is widely advocated as a women empowerment tool to spur development outcomes (Mishra and Sam 2016; Montenegro, Mohapatra, and Swallow 2016; Wiig 2013). Land is the key asset in rural areas, and the main pathway of land accession is through inheritance. Women's land ownership is critical to ensure their empowerment and welfare consistent with the realization of gender equality according to the United Nations Sustainable Development Goals (SDG), and many governments have strengthened their land registration regulations to protect women's land rights (Deininger et al. 2014; Deininger 2014; Deininger, Goyal, and Nagarajan 2013; Deininger, Ali, and Yamano 2008).

The Government of India enacted the 2005 Hindu Succession Amendment Act (HSAA), which ensured an equal share in ancestral property for men and women. This was a significant move toward gender equality since land tenure rights were heavily biased against women in India before 2005 (Agarwal 1994a). Previous studies found that the likelihood of inheriting land for women slightly increased, while a significant gender bias remains (Deininger, Goyal, and Nagarajan 2013; Roy 2008, 2015; Bose and Das 2017). Two major reasons for the glaring unequal distribution of land to Indian women have been recently suggested in the popular press (Mohan 2017). First, personal religious law governs ownership of land, which is under state jurisdiction, not governed by the constitution under a uniform law that guarantees fundamental rights of equality to all citizens, and thus inheritance rights tend to discriminate against women. Second, land ownership by women in India's patriarchal societies is prevented by the deep-rooted cultural ethos. There are existing studies that investigate the relationship between land title and women's empowerment. Santos et al. (2014), for instance, used household data from Landesa's *Nijo Griha, Nijo Bhumi* program in West Bengal. They found that women's land title ownership was positively associated with their participation in decisions regarding the use of agricultural land and the purchase of productive assets. Roy (2008) also used household data in India and found that women's inheritance rights increase their autonomy within their marital families. However, our knowledge about the effects of women's land title ownership on their status in the family is still scarce.

This paper attempts to fill these gaps. Specifically, it seeks to analyze the effects of having women's name on the land title on their participation in a large set of household decision-makings in India, where land property is typically family governed, and where preexisting norms may bias against women's land ownership. We used a household survey of 8,640 rural households interviewed in 2016, asking about the existence and the name on land titles to identify three groups: no land title, men's name on title, and women's name on title. Since this information is sensitive we adopted a gender sensitive approach in which female enumerators were sent to sample households to interview female participants, and male enumerators collected information from male respondents at the same time. Except for the basic household characteristics, throughout the interview the female enumerators and respondents were isolated from the male enumerators and male respondents. This allowed females to respond freely when female-specific questions were asked, particularly women's involvement in decision-making.

Our aim is to investigate if women's individual land titling increases their empowerment based on their involvement in decision-making in the family. Agarwal (1994a) argues that individual land ownership is potentially more empowering for women in South Asia as women and men may have different priorities. In particular, women are more likely to be able to make decisions if they own their own parcel outright and do not have to negotiate with their husbands or other male members (sometimes with the extended household male members such as brother, father, grandfather etc.). Since more empowered women are more likely to own land titles based in part on unobserved characteristics, we use an instrumental variable (IV) strategy to address this endogeneity issue in estimating the effects of land title ownership on women's participation in decision-making.

Another contribution of this paper is that we ask about women's role in 10 decisions, which were grouped into three broad categories: farming, livelihood, and household activities. In doing so, we captured insightful variation in women's involvement across different real-life decision-making. Thus, along with three groups of land titling mentioned earlier, this is the first study to consider the impacts of land titling of women on various family decisions systematically in a household survey. We hypothesized that: (i) having women's names on land titles has positive impacts on their participation in family decisions; and (ii) there is significant difference in women's land title effect on decision-making participation between states, as land is under state jurisdiction that is not governed by the constitution under a uniform law (Mohan 2017).

In the next section, we discuss some background on decision-making by gender and land inheritance in India. Section III describes the data used in this study and provides some descriptive analyses. The estimation model and variables are discussed in section IV, followed by the results in section V. Finally, section VI presents the conclusion and policy implications.

II. BACKGROUND

A. Decision-Making by Women

Beginning with Manser and Brown's (1980) collective bargaining model of differences in spousal preferences, numerous studies have provided a theoretical framework on the relationship between the bargaining power by a woman and her relative fall-back position or threat-point (Carter and Katz 1997, Lundberg and Pollak 1994, McElroy and Horney 1981). Several explanations for a woman's fall-back position have been identified in the literature. These include: asset ownership by women, especially land in rural areas (Twyman, Useche, and Deere 2015); social norms and legal framework where women live (Agarwal 1994a, Sen 1990); women's education and employment (Samarakoon and Parinduri 2015; Trommlerová, Klasen, and Leßmann 2015); individual knowledge and ability (Agarwal 1997); and the degree to which women can get extra household support from family, community, and state (Twyman, Useche, and Deere 2015).

As mentioned in section I, previous studies of women's participation in household decision-making were conducted mostly on a small number of household activities. One exception is Anderson, Reynolds, and Gugerty (2017), who examined differences in the wife's authority over 13 household and farming decisions. They used ordinary least squares and logistic regressions to 1,851 Tanzanian households whose data was collected in 2010, and found that husband and wife self-reported authority vary systematically across households and decisions even after controlling for individual, household, and regional characteristics. The husband–wife discrepancies in self-reported authority

over household decisions suggest the importance of accurately characterizing intrahousehold decision-making dynamics. Unlike Anderson, Reynolds, and Gugerty (2017), the contribution of this study is the investigation of the relationship between women's land title ownership and their participation in decision-making. There are also studies that identify other determinants of women's participation in household decision-making. Bayudan-Dacuycuy (2013), for instance, used panel data from the Philippines. Using logit regression, she found that the wife's decision-making participation status was positively influenced by the presence of her spouse's parents in the household, but the effects varied for daily household decisions and major household financial decisions. De Brauw et al. (2014) used data from 15,426 households in Brazil collected in 2005 and suggested that Bolsa Familia conditional cash transfer program in general increased women's decision-making power about contraception use, children's school attendance and health expenses, and household durable goods purchases in urban households.

In addition, there are several other studies that examined the relationship between women's land title ownership and their participation in household decisions. Santos et al. (2014), for example, used the 2010 data from 1,373 household in West Bengal and found that having women's name on the land titles was positively associated with their participation in decisions regarding the use of agricultural land and purchase of productive assets. Roy (2008) also found similar evidence in India with respect to increases in women's autonomy within their marital families based on the 2005–2006 National Family and Health Survey dataset that covers 28,000 ever-married women. From other contexts, Mishra and Sam (2016) provided evidence that Nepalese women's participation in decisions about their own health care, major household purchases, and visits to family or relatives increases based exclusively on whether or not they have land ownership. Wiig (2013) estimated the impacts of men's and women's inheritance on women's participation in household decision-making in rural Peru and found a significantly positive impact on female empowerment, but only from the perspective of joint land titling. The case of joint land titling in Ecuador was also investigated by Twyman, Useche, and Deere (2015), but they only examined gender differences in perceptions about land ownership and agricultural decision-making.

The above studies lump land titles for both men and women in the household, but this is a source of bias. The classification in this study avoids that bias by distinguishing the schema based on who owns the land title through the separate identification of men's land title, women's land title, and individuals with no titles. Furthermore, they only investigated women's participation in few household decisions including their own health care, major household purchases, visits to family or relatives (Mishra and Sam 2016), purchase of agricultural assets, use of agricultural land, sales of crop produce (Santos et al. 2014), and autonomy within marital families (Roy 2008). Therefore, we identify land title ownership by men and women and estimate the associations between women's participation in several family decisions and their land title ownership. In general, being able to identify and collect gender-specific data on land title ownership is consistent with the global initiative called Evidence and Data for Gender Equality (EDGE) project, which is crucial for designing effective policies to address existing gender gap in ownership and control of assets (Joshi and Martinez 2017), including land.

B. Women's Land Inheritance in India

In India, the Hindu Succession Act of 1956 (HSA 1956) is the fundamental law governing present day inheritance rights of four religions: namely Hindus, Buddhists, Jains, and Sikhs. Since Indian inheritance laws are enacted according to religious contexts, Muslims and Christians also have their own sets of

property laws.[1] According to Roy (2015), the HSA 1956 is the foundation for a law of succession characterized by sons and daughters having equal inheritance rights to family property. As noted by Bose and Das (2017), however, daughters could jointly inherit property acquired directly by their fathers, but ancestral property could only be inherited by sons. For this reason, the joint family property itself is a source of gender bias, which is worsened by the fact that a substantial amount of property is family owned, particularly in rural areas.

To address the problem of inheritance discrimination against women, the HSA 1956 law was amended between 1970s and 1990s by five Indian states of Andra Pradesh, Tamil Nadu, Kerala, Karnataka, and Maharashtra to allow women to inherit ancestral property, as long as they married at the time of the reform (Bose and Das 2017).[2] According to Agarwal (1994a) and Roy (2015), the amendments stated that women who were unmarried at the time the reform was passed in their state would be granted claims equal to that of their brothers in ancestral or joint family property, including the right to a share by survivorship. The 2005 HSAA changed these rules and allowed women to have an equal share in ancestral property.

The existing literature on women's inheritance rights in India agrees that significant gender bias persists following the reform. However, there is mixed evidence as to the impact on the likelihood of women inheriting the land. Deininger, Goyal, and Nagarajan (2013), for example, used data from the 2006 round of the Rural Economic and Demographic Survey on 8,190 rural households in 16 major states in India and found that the reform significantly increased women's likelihood to inherit land. In contrast, Roy (2015) found opposite results based on 4,207 women from the 1999 wave of the National Family Health Survey. Both of these two studies found instead that the girl's educational attainment increased following the reform. Similarly, Bose and Das (2017) found that the amendment had a positive impact on women's years of schooling based on data from the 2004–2005 Indian Human Development Survey.

One limitation of the above studies is that they only focused on the impacts of the land rights reform of 2005 on the likelihood of women's inheritance and educational attainment of daughters. These studies also did not investigate the impact of women's inheritance on their participation in household decision-making. We address these gaps by estimating the relationship between women's land title ownership and their participation in household decision-making.

III. DATA AND DESCRIPTIVE ANALYSIS

Our study is based on a rare individual-level data on women's participation in decision-making collected by the International Rice Research Institute through the administration of the 2016 Rice Monitoring Survey, that covers 8,640 households in four states (Bihar, Eastern Uttar Pradesh, Odisha, and West Bengal) in India. Sample villages and households were randomly selected through the following procedures: (i) the total number of sample villages in each state was chosen to be randomly proportional to the total number of rural households of the state, (ii) all sample villages were randomly selected from the rural villages defined in the 2011 Census of India, and (iii) the household selection was done using a random sample drawn from the village census.

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[1] For example, the Indian Succession Act 1925 is the governing law for a Muslim who died intestate where a will relates to immovable property situated within the State of West Bengal, and that of Madras and Mumbai Jurisdiction. Likewise, laws of succession applicable to Christians and Jews are based on the Indian Succession Act 1925.

[2] Both the central and state governments in India have legislative authority over inheritance (Roy 2015) and the implementation of laws on land rights varies by state, which is why some states have amended the HSA 1956, while other states did not amend its inheritance.

The survey was tailored to allow crude measurement of the extent of involvement in farming, livelihood, and household decisions from the perspectives of men and women. To be specific, male and female respondents in each household were interviewed separately in terms of their inputs on decision-making regarding a specific activity. Where it is applicable, the corresponding responses could be either "no input" or "input" into some decisions (25%–50%) or "input" into most of all decisions (50% above), which we coded respectively as no, little, and large involvement in decision-making. Information on several decision-making activities was collected; in particular: (i) farming decisions including crop selection, variety selection, food crop farming, and cash crop farming; (ii) livelihood decisions including livestock production, nonfarm activities, and wage/salary employment; and (iii) household decisions including major expenditure, minor expenditure, children's schooling, and whether or not to use family planning to space or limit births. As for land title by gender, we collected information on who owns the plot, the year, and means of plot acquisition, and whether the land title is registered in a man's or woman's name. Furthermore, the survey collected detailed information on individual characteristics of all household members, and household characteristics.

Table 1 shows the number of districts, households, and the proportion of households with men and women having land titles by state. Among the total 8,640 households selected from 101 districts, we focus on a sample of 6,378 rural households who have only acquired a plot of land, irrespective of whether or not a land title exists on this plot. Of the 6,378 households, we categorized them into three groups: no land title, men's name on title, and women's name on title. Few studies explicitly capture formal land title either for women only or for both men and women, which is a source of bias. We overcome this limitation by asking whose name was placed on the land title and identifying whether a man's or a woman's name was on the land title and then comparing it to the dropped base group of individuals with no land title. As a whole, around 79% of households in India have land titles. Nearly 6% of households have land titles registered in women's names in West Bengal. It is noticeable that only 2%–3% of households in Bihar, Odisha, and Uttar Pradesh have women's names on the land titles. Therefore, the share held by Indian women is very small, which implies that they remain largely excluded from land ownership despite amendments in inheritance law. In other words, significant gender inequalities in land ownership in India continue to exist as other studies have documented earlier (Bose and Das 2017; Deininger, Goyal, and Nagarajan 2013; Roy 2008, 2015).

Table 1: Number of Sample Districts, Households, Proportion of Households with and without Land Titles, and Proportion of Households by Name on Land Titles and by State

			Percent of Households by Land Title Ownership		
State	Districts	Households	No Title	Men's Title	Women's Title
Bihar	37	2,112	21.9	76.2	2.1
Odisha	30	2,700	32.7	65.2	2.5
Uttar Pradesh	16	1,812	24.5	73.0	3.3
West Bengal	18	2,016	27.1	68.6	5.5
Total	**101**	**8,640**	**27.2**	**70.2**	**3.1**

Source: Authors' calculations based on data from IRRI. 2016. *Rice Monitoring Survey 2016 in India.* Los Baños, Philippines.

To examine further individual land ownership by gender, we present in Table 2 details of land acquisition and land title ownership. About 89% of the 11,920 plots were acquired through inheritance, indicating that inheritance is the dominant land acquisition mode in eastern India. Among them, 10.8% of the plots have no land title. Men's names were registered on 85.6% of the inherited plots, while women's names were registered on 3.4% of them. Only a smaller proportion, 6.1%, of all plots was purchased, which suggests weak land markets in rural areas. Again, men's names were registered on majority of the purchased plots. Women's names were relatively more registered when the plots were given as a gift: 10.5% of the gifted plots were registered under women's names. As noted by Bose and Das (2017), land dowry is practiced in India and hence those plots that were received as a gift could be part of dowry. This is against a proposition suggested by Roy (2015) that Indian parents were giving their share of land to sons as a gift to circumvent the law and thereby avoid giving property to the daughter. Our data suggest that daughters were given land also. To investigate more, we need to examine land transfers between parents and children after the implementation of the 2005 HSA. Furthermore, about 1.7% of the plots, 202 plots, were acquired though sharecropping. Among them, 5% of the plots are without titles, and 94% and 1% are under male and female names, respectively. This supports the observation that a small number of plots were transferred to those who cultivate land (Newman, Tarp, and Van Den Broeck 2015).

A. Land Acquisition Mode by Gender over Time

In Figure 1, we plot individual land title ownership by acquisition year to explore women's land inheritance in relation to changes in land legislation. As mentioned earlier, Indian women were discriminated against inheritance under the HSA 1956, which eventually led to the nationwide adoption of the 2005 inheritance reform (Deininger, Goyal, and Nagarajan 2013). Hence, we capture these periods in Figure 1 by dividing the land title ownership into three acquisition years: (i) before 1956, (ii) 1956–2005, and (iii) 2006–2015. We find that although there seems to be gender bias, women's land inheritance rights improved after 1956 and 2005. To be specific, women's land acquisition through inheritance slightly increased from 5.5% in 1956–2005 to 6.4% in 2006–2015. About 87% of men with land titles have inherited land after the reform in 2005, confirming that land inheritance rights remain biased against women.

Table 2: Number and Proportion of Individuals by Plot Acquisition and by Name on Land Titles

	Plot Acquisition Composition		Proportion of Households by Land Title Ownership (%)		
	Number	Percentage (%)	No Title	Men's Name on Title	Women's Name on Title
Inherited	10,660	89.4	10.8	85.9	3.4
Purchased	731	6.1	6.8	87.6	5.6
Sharecropping	202	1.7	5.0	94.1	1.0
Received as gift	172	1.4	16.9	72.7	10.5
Others	155	1.3	7.7	85.2	7.1
Total	**11,920**	**100.0**	**10.5**	**85.9**	**3.6**

Source: Authors' calculations based on data from IRRI. 2016. *Rice Monitoring Survey 2016 in India.* Los Baños, Philippines.

To examine the variation across states, we illustrate land inheritance by acquisition year in Figure 2. The graph shows that a larger proportion of women in West Bengal have acquired the land through inheritance after 2005, while the proportion of inheritors in other states were smaller in the same period. The acquisition of land by men in terms of inheritance declined after 2005. A plausible interpretation of this finding is that men's disinheritance reduces gender bias against women's inheritance rights. In addition, the proportion of women inheritors in Uttar Pradesh increased after 2005, but their land title ownership remained very small. Individuals with no land titles are also increasing in Uttar Pradesh, possibly because this state has not yet amended its inheritance and tenancy laws to allow equal inheritance rights to daughters and sons (Rao 2017). Overall, the discussions above suggest that it is crucial to see whether the impact of women's land title on their decision-making participation varies by state.

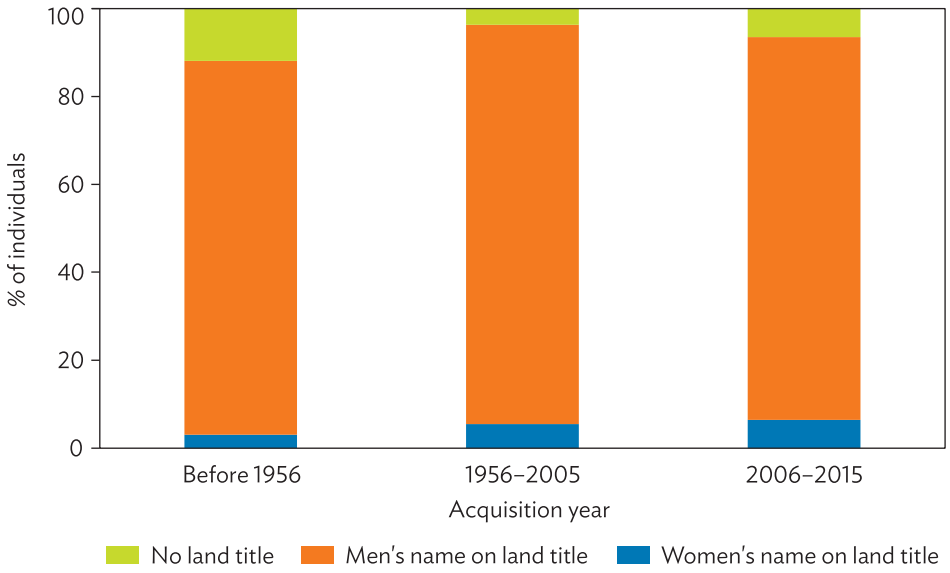
B. Individual Characteristics of Land Title Holders

Table 3 summarizes some attributes of individuals and their household characteristics and social group by land title ownership. The average age of women with land titles is 56 years old, and 52 years old for men with land titles. Individuals with no land title are relatively younger at 49 years of age. In terms of schooling, women with land titles have lower levels of education as compared to both no title and men's name on title groups. Looking at the relationship to the household head, 92% and 35% of men and women, respectively, are household head. In addition, 39% of women with land titles are parents, while 35% and 17% are, respectively, household heads and spouses. Therefore, it seems that women with land titles are all widows or divorced, but one would think largely the former.[3] From an empowerment evaluation perspective, Indian widows with land titles living with adult sons are likely to have a stronger say in the family because they were treated with higher respect relative to women who are landless and economically dependent (Agarwal 1994a, 1994b).

For households with women and men having land titles under their names, the average size of land is lower relative to the no title group. Households with women's name on the land title had more male members migrating, and below poverty line (BPL) cards, which gives households access to government support including a monthly allotment of subsidized rice (Emerick et al. 2016). As for the social group as a whole, the proportion of scheduled tribes (STs) and general caste is higher for households with women having land titles, while the number of other backward classes (OBCs) is higher for households with no title and men having land titles. In addition, there is no noticeable difference in the proportion of scheduled castes (SCs) between the three groups in general, but there is a significant difference in terms of land title distribution in Bihar, Odisha, and West Bengal (results not presented in the interest of brevity).

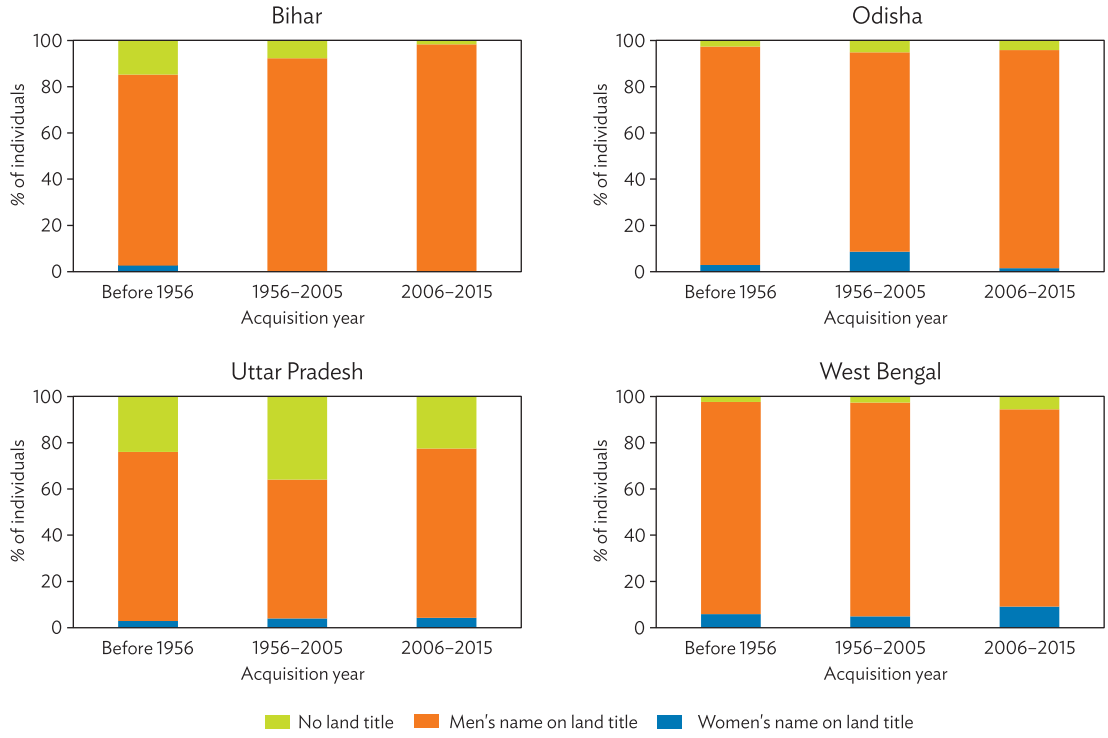
[3] A widow's claims to her marital property are largely seen as legitimate (Rao 2017).

Figure 1: Land Title Ownership by Acquisition Year in Eastern India



Note: Before 1956 includes 1900, 1909, and 1955.
Source: Authors' calculations based on data from IRRI. 2016. *Rice Monitoring Survey 2016 in India.* Los Baños, Philippines.

Figure 2: Land Title Ownership by State and by Acquisition Year in Eastern India



Note: Before 1956 includes 1900, 1909, and 1955.
Source: Authors' calculations based on data from IRRI. 2016. *Rice Monitoring Survey 2016 in India.* Los Baños, Philippines.

Table 3: Individual and Household Characteristics by Land Title Ownership

		Land Title Ownership by Gender		
	All	No Title	Men	Women
Individual characteristics				
Age	52.20	49.00	52.40	55.80
Schooling	5.90	6.90	6.00	2.10
Relationship to head				
Self (head) (=1)	0.90	0.90	0.92	0.35
Spouse (=1)	0.01	0.02	0.00	0.17
Parent (=1)	0.08	0.07	0.06	0.39
Others (=1)	0.02	0.01	0.01	0.09
Household characteristics				
Land size (ha)	0.81	1.04	0.78	0.88
BPL (=1)	0.50	0.46	0.50	0.53
Migration (=1)	0.17	0.17	0.16	0.21
Social group				
SC (=1)	0.12	0.14	0.12	0.12
ST (=1)	0.13	0.04	0.14	0.20
OBC (=1)	0.42	0.49	0.42	0.31
General (=1)	0.32	0.33	0.32	0.37
No. of observations	11,920	1,250	10,240	430

BPL = below poverty line, ha = hectare, OBC = other backward class, SC = scheduled caste, ST = scheduled tribe.
Source: Authors' calculations based on data from IRRI. 2016. *Rice Monitoring Survey 2016 in India.* Los Baños, Philippines.

Table 4 presents the reported participation by women in decisions about farming, livelihood, and household activities with respect to who owns the land title. As expected, women's participation in decision-making in most of these activities is significantly higher for women with land titles. This pattern is consistent with the idea that women are empowered by secured land rights through enhanced intrahousehold bargaining and decision-making power (Landesa 2012, Mishra and Sam 2016, Wiig 2013). Although the differences are not statistically significant, women's participation in the decision about family planning is also higher for women with land titles as compared to the base group and men's name on title group. This pattern is supportive of the finding that increased women's status relative to their husbands' is associated with increased use of modern contraception in India (Jejeebhoy 2002).

Table 4: Proportion of Women Who Participated in Farming, Livelihood, and Household Decision-Making by Land Title Ownership

			Land Title Ownership by Gender	
Decisions	All	No Title	Men	Women
Farm decisions				
Crop selection	36.8	37.0	36.2	71.1***
Variety selection	36.2	37.1	35.3	70.7***
Food crop farming	34.4	35.0	33.6	69.4***
Cash crop farming	20.1	19.6	20.1	60.0***
Livelihood decisions				
Livestock raising	73.9	77.2	68.2	95.1***
Nonfarm activities	33.8	36.9	30.0	70.8***
Household decisions				
Major expenditure	43.1	43.9	42.0	58.1*
Minor expenditure	88.3	89.0	86.2	98.7***
Children's education	56.9	59.9	51.1	92.0***
Family planning	59.3	61.8	53.1	68.8

Note: *** and * denote statistical significance at the 1% and 10% levels, respectively.
Source: Authors' calculations based on data from IRRI. 2016. *Rice Monitoring Survey 2016 in India.* Los Baños, Philippines.

IV. ESTIMATION MODEL AND VARIABLES

A. Estimation Model

First, we estimate across all four states the effects of women's names on land title on their participation in decision-making. Yet, identifying the causal link between women's land title ownership and participation in decision-making will be problematic because of endogeneity concerns. Estimates of women's land title coefficient that fail to account for this endogeneity could be a source of bias. The endogeneity could arise, for example, if empowered women or women that are making decisions might be more likely to be able to purchase land and have land titles since they may also have a higher income earning ability. In contrast, less empowered women could be more easily pushed aside by strong husbands despite the inheritance reform in 2005. Thus, we employ an IV approach to address the endogeneity of women's land title ownership. The system of equations we estimate is as follows:

$$D_{ij} = \beta_0 + \beta_1 Men_i + \beta_2 Women_i + \beta_3' X_i + \beta_4' X_h + \varepsilon_i \quad (1)$$

$$Women_i = \gamma_0 + \gamma_1' X_i + \gamma_2' X_h + \gamma_3' Z_i + u_i \quad (2)$$

where the dependent variable, D_{ij}, takes the value of 1 if a woman i in household h has a large input (i.e., 50% and above) in making a decision in activity j, and zero otherwise; Men_i and $Women_i$ are dummy variables indicating whether men and women, respectively, have their names on the land titles;

X_i is a vector of individual characteristics including age, years of schooling, and dummies for household head, spouse, and parent; X_h is a vector of household characteristics including land size, and dummies for male out-migration, whether a household has a BPL card, SC, ST, OBC, and general caste; Z_i are exogenous variables to be used in the first stage of the system as instruments for the endogenous women's land title variable; and ε_i is an unobserved random error term. The dependent variable for decision-making participation includes 10 activities as described in the previous section. The main explanatory variables in equation (1), men's and women's names on the land titles, are compared to the dropped base group no land title. Following the idea that secured land rights enhance women's intrahousehold bargaining and decision-making power, one would expect the sample estimate of β_2 to be positive and statistically significant.

For the IV approach, we use a set of variables that interact state dummy with the before and after 2005 dummy variables. That is, we identify the timing of inheritance and then allow the women's land title coefficient to vary depending on the before and after 2005 inheritance. The latter coefficient should be attributed to exogenous change by the 2005 Act.[4] We estimate the system of equations (1)–(2) above through a two-stage least squares (2SLS) estimator, which produces consistent estimates and accounts for correlation structure in the disturbances across women's participation equations. We estimate a system of linear probability models, which have the advantages of being generally more tractable for assessing causation and applicable to data with limited dependent outcome variable and dummy endogenous regressors (Angrist 2001).

Next, we estimate women's participation model by state for two main reasons. First, both the central and the state governments in India have legislative authority over inheritance, making it a concurrent issue (Roy 2015). Second, it has been mentioned earlier that there were more women inheritors in West Bengal, while there were only very few in Bihar, Odisha, and Uttar Pradesh. Thus, we estimate a similar specification for each of the four states:

$$D_{ijs} = \beta_0 + \beta_1 Men_{is} + \beta_2 Women_{is} + \beta_3' X_{is} + \beta_4' X_{hs} + \varepsilon_i \quad (3)$$

where D_{ijs} is equal to 1 if a woman i in household h in state$s$ has significant involvement in decision j, and zero otherwise; Men_{is} and $Women_{is}$ are dummies for men and women with land titles in states; X_{is} is a vector of individual characteristics including age, education, and dummies for relationship to head in states; X_{hs} is a vector of household characteristics including land size, and dummies for male out-migration, BPL card, and castes in state*s*.

B. Variables

We have already discussed how we constructed the dependent variable in the previous section (i.e., women's participation in household decision-making) and the expected relationship to women's land title. In the participation model, we include individual characteristics such as women's age, education, and relationship to household head, consistent with previous studies (see, for example, Mishra and Sam 2016, Allendorf 2007, Kabeer 1999). The age variable is expected to control for authority in the household that affects land ownership and empowerment in the context of South Asian countries (Kabeer 1999; Mahmud, Shah, and Becker 2012; Mishra and Sam 2016). We incorporate years of schooling as an individual level control since education can empower women socially and economically (Kabeer 1999, Mishra and Sam 2016, Samarakoon and Parinduri 2015).

[4] We thank Yasuyuki Sawada for this valuable suggestion.

Moreover, the women's decision-making participation model includes three dummies for relationship to household head, namely: head, spouse, and parent. According to Mishra and Sam (2016), being the wife of the household's prime decision maker can give an upper hand in influencing decision-making. We also include a set of variables such as male out-migration dummy, land size, BPL card dummy, and three caste dummies for SC, ST, and OBC.

V. RESULTS

A. Women's Participation in Decision-Making in India

Our aim is to examine the impact of women's land title ownership on participation in decision-makings (i.e., farming, livelihood, and household decisions). We first test for potential endogeneity of the women's land title variable through a Durbin–Wu–Hausman test. Results are reported in Table 5. The Chi-square statistics are very high in almost all of the cases, suggesting that the null hypothesis that the women's land title variable is exogenous should be rejected. Also, the validity of instruments is checked through the Sargan overidentification test, based on which we cannot reject the hypothesis that the instruments are uncorrelated with the error process.

Results based on the 2SLS estimation of equations (2) and (3) are reported in Table 6, where we present various decision-making participation specifications using women's land title variable as the main explanatory variable. The 2SLS procedure applies an IV procedure to produce consistent estimates. Results from the IV regression show that the effect of women's land title is positive and significant for women's participation in all 10 family decisions.[5] This may be the result of the policy or law that enhances land rights equity to increase women's status in the family. Women's land ownership gives them more bargaining power, and thus an increase in their ability to influence household decisions. The above finding also corroborates with Santos et al. (2014), who found that women with land documents under their names have a say over a larger share of their households' land in terms of the decision on how to use the land, what to grow on it, and whether to sell the produce from that plot in West Bengal. In this study, however, our distinction of who owns the title enables us to show that women's land title ownership has indeed increased their participation in decision-making relative to those with no land title. Overall, the findings discussed above support our hypothesis that having women's names on land titles increases their participation in family decisions.

The results also show that men's title has a positive effect on women's participation in most family decisions. This finding may imply that even when men have land titles this does not automatically mean that women will have less decision-making power in the household. Looking at individual attributes, age shows negative effect on women's participation in decisions in most of the cases, except for decisions about livestock raising and major household expenditure. This indicates that participation in the decision about these activities provides more status in the family for younger than for older women. The effects of schooling suggest that higher education increases the women's participation in the decisions about variety selection, crop production, nonfarm activities, major

[5] Qualitatively speaking, our results are robust to variations in the timing of enforcement of the 2005 Inheritance Act. In this exercise, we use the timing of enforcing the 2005 Act in identifying the before and after changes both for IV regressions across four states and each state. Our household dataset indicates that the Inheritance Act was implemented in 2005 for Odisha and West Bengal, 2007 for Uttar Pradesh and 2008 for Bihar. Accordingly, we use a set of IVs that interact state dummy with dummy variable capturing the before and after changes based on the timing of implementing the Inheritance Act.

household expenditure, and children's education. This suggests that participation in the decisions about those activities gives more bargaining power in the household for highly educated women. As noted by Mishra and Sam (2016), education and employment provide women economic independence and a sense of self-worth, which can empower them socially and economically.

Table 5: Specification and Overidentification Tests on Instrumental Variables

	Durbin–Wu–Hausman Test	P-value	Overidentification Sargan Test	P-value
Farm decisions				
Crop selection	111.162	0.000	0.236	0.627
Variety selection	126.004	0.000	0.080	0.961
Food crop farming	104.100	0.000	4.091	0.769
Cash crop farming	11.128	0.001	6.997	0.136
Livelihood decisions				
Livestock raising	11.046	0.001	0.756	0.685
Nonfarm activities	152.398	0.000	2.291	0.942
Household decisions				
Major expenditure	22.244	0.000	3.785	0.286
Minor expenditure	3.205	0.073	3.390	0.640
Children's education	56.300	0.000	10.116	0.120
Family planning	28.175	0.000	4.766	0.689

Source: Authors' calculations based on data from IRRI. 2016. *Rice Monitoring Survey 2016 in India.* Los Baños, Philippines.

Whether an individual is the head is expected to increase the participation of women in household decisions. Indeed, being a head shows positive impacts on crop production and major household expenditure. On the other hand, being the head has negative effect on women's participation in decisions about livestock raising and family planning. Meanwhile, the effect of the spouse dummy is positive and significant for women's participation in most of the cases, which means more bargaining power in the household insofar as they are active participants in those decisions. The parent dummy has negative effect on women's participation in most of the family decisions, except for decision about minor expenditure. The latter maybe due to the possibility that parents-in-law are supportive of the female members of the household in terms of their say in this activity. Moreover, the effect of land size is negative and significant for women's participation in most of the family decisions, suggesting the need for secured land rights for landless and marginal women. Likewise, the effect of migration dummy is negative and significant only for decisions about nonfarm activities and livestock raising. The BPL card has a positive effect on women's participation in decision-making in majority of the cases.

Table 6: Instrumental Variable Results for Women's Participation in Decision-Making in India

	Farm Decisions				Livelihood Decisions		Household Decisions			
	Crop Selection	Variety Selection	Crop Production	Cash Crop Farming	Livestock Raising	Nonfarm Activities	Major Expenditure	Minor Expenditure	Children's Schooling	Family Planning
Land title										
Women's land title	17.8810***	20.9596***	7.0278***	6.9972**	1.9357***	10.7762***	7.4529***	0.6416**	8.7301***	13.6779**
	(5.380)	(6.646)	(1.038)	(3.008)	(0.562)	(1.473)	(2.080)	(0.295)	(1.687)	(5.624
Men's land title	0.2685***	0.2871**	0.0606**	0.1109*	0.0960***	0.0794***	0.0503**	0.0856***	0.0704***	0.1032
	(0.103)	(0.118)	(0.027)	(0.061)	(0.016)	(0.024)	(0.025)	(0.011)	(0.025)	(0.065
Characteristics of female respondents										
Age	−0.0046**	−0.0059**	−0.0030***	−0.0024*	−0.0005	−0.0025***	−0.0010	−0.0009***	−0.0029***	−0.0035*
	(0.002)	(0.003)	(0.001)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.002)
Schooling	0.0442	0.1116**	0.0811***	−0.0005	0.0180	0.0737***	0.0648***	0.0013	0.0649***	0.0411
	(0.048)	(0.052)	(0.025)	(0.031)	(0.014)	(0.020)	(0.018)	(0.008)	(0.022)	(0.036)
Head (=1)	−0.0041	−0.0320	0.0929**	0.0742	−0.1141***	0.0038	0.0698**	−0.0516***	0.0290	−0.1003**
	(0.090)	(0.099)	(0.042)	(0.054)	(0.024)	(0.029)	(0.029)	(0.013)	(0.030)	(0.048)
Spouse (=1)	0.2224*	0.0737	0.1849***	−0.0710	0.1808***	0.1722***	0.1889***	0.1363***	0.3633***	0.1772***
	(0.125)	(0.149)	(0.062)	(0.095)	(0.024)	(0.045)	(0.044)	(0.012)	(0.032)	(0.048)
Parent (=1)	−0.9306***	−0.6512***	−0.0762	−0.1314	−0.1045**	−0.2069***	−0.2331**	0.0451*	−0.5238***	−0.8659**
	(0.294)	(0.231)	(0.071)	(0.120)	(0.047)	(0.059)	(0.090)	(0.024)	(0.127)	(0.354)
Household characteristics										
Land size (ha)	−0.0198	−0.0155	−0.0156	−0.0479***	−0.0400***	−0.0178*	−0.0367***	−0.0036	−0.0388***	−0.0657**
	(0.023)	(0.025)	(0.012)	(0.014)	(0.007)	(0.010)	(0.010)	(0.005)	(0.013)	(0.028)
Migration (=1)	−0.0845	−0.1068	0.0067	0.0336	−0.0269*	−0.0724***	−0.0375*	0.0044	−0.0156	−0.0659
	(0.059)	(0.070)	(0.029)	(0.039)	(0.016)	(0.022)	(0.022)	(0.009)	(0.025)	(0.052)
Below poverty line (=1) card	0.0890**	0.1397***	0.0374*	0.1213***	0.0759***	0.0692***	0.1089***	0.0620***	0.0785***	0.0470
	(0.038)	(0.045)	(0.020)	(0.024)	(0.012)	(0.016)	(0.017)	(0.007)	(0.019)	(0.031)
Social group										
Scheduled caste (=1)	0.1490**	0.1650**	0.0820***	0.0602*	−0.0046	0.0864***	−0.0253	−0.0399***	−0.0066	0.0282
	(0.062)	(0.070)	(0.031)	(0.035)	(0.018)	(0.024)	(0.022)	(0.010)	(0.027)	(0.044)
Scheduled tribe (=1)	0.2723***	0.2828***	0.3094***	0.0911	0.0637***	0.2491***	0.0283	0.0066	0.2275***	0.1374***
	(0.074)	(0.081)	(0.036)	(0.064)	(0.019)	(0.027)	(0.030)	(0.011)	(0.031)	(0.050)
Other backward classes (=1)	0.0909**	0.1448***	−0.0050	0.0838***	−0.1230***	−0.0122	−0.1068***	−0.0609***	−0.0444**	−0.0345
	(0.045)	(0.055)	(0.024)	(0.027)	(0.014)	(0.019)	(0.018)	(0.008)	(0.021)	(0.035)
Constant	0.2493**	0.2418**	0.3410***	0.4149***	0.7918***	0.4566***	0.4004***	0.8720***	0.5803***	0.8477***
	(0.102)	(0.112)	(0.052)	(0.062)	(0.028)	(0.037)	(0.035)	(0.016)	(0.039)	(0.077)
No. of observations	6,756	6,736	5,564	4,072	5,728	11,559	8,204	8,636	6,412	4,355

ha = hectare.

Notes: Standard errors in brackets. ***, **, and * significant at the 1%, 5%, and 10%, respectively. Base category for land title is individual with no land title. Base category for relationship to household head is children. Migration is dominated by male migrants.

Source: Authors' calculations based on data from IRRI. 2016. *Rice Monitoring Survey 2016 in India.* Los Baños, Philippines.

Focusing on social group, the results in general suggest that SC, ST, and OBC women have a higher participation in decisions related to farming and nonfarm activities, which indicates that women who belong to the marginalized castes have more bargaining power when it comes to their participation in those decisions. Indian women from lower castes like SC and ST groups are more involved in farming. In fact, agricultural laborers that are often hired in villages also belong to these marginalized caste groups. As noted by Paris et al. (2008), Indian women from lower castes, notably those with marginal and small landholdings, work as unpaid family labor, and as exchange and hired laborers in other fields. Similarly, ST women have higher participation in some family decisions such as children's schooling and family planning. In contrast, ST women have a lower participation in decision about household expenditures. The OBC dummy also shows negative effect on women's participation in decisions about livestock raising, household expenditures, children's schooling, and family planning.

B. Effect of Women's Land Title Ownership by State

Next, we examine the causal relationship between women's land title ownership and their participation in decision-making by state. Since land is a state subject in India and the legal provisions for inheritance continue to discriminate against women despite the nationwide extension of HSAA main provision in 2005 (Deininger, Goyal, and Nagarajan 2013), this may have impacted on the analysis by state. That is, if gender bias against women's land inheritance persists, then this has an impact on what happens on their inheritance and status in the family at the state level. Consequently, it is worthwhile to analyze a state level estimate of probit model of women's land title ownership and decision-making participation.

Results from IV regression by state are presented in Tables 7–10. We also apply the Sargan overidentification and the results that are not reported here to conserve space support the validity our instruments. In comparison with the results in Table 6, the counterparts in Tables 7–10 show the following observations. First, the effect of women's land title ownership is still positive and significant in Odisha, Uttar Pradesh, and West Bengal in most of the family decisions. To be precise, Table 9 shows that women's land title ownership has a positive effect on the participation by women in all family decisions. This finding is consistent with our descriptive analysis showing an increase in the percentage of women who inherited land in Uttar Pradesh after 2005. Likewise, Table 8 shows that land title ownership by women in Odisha increases women's participation in decision-making in most of the cases. Furthermore, the results in Table 10 show that the effect of land title ownership is positive and significant for women's participation in the decisions about farming, nonfarm activities, and children's education in West Bengal. This finding corroborates with the descriptive analysis showing a larger proportion of women in West Bengal who have inherited land after 2005. In contrast, the effect of women's land title ownership is not significant in all cases for Bihar, which can be attributed to the fact that there was no progress in women's land inheritance in this state even after the reform in 2005. As a whole, the impact of women's land title ownership varies across states, which can be attributed to whether or not the legal provisions for inheritance remain biased against women is pronounced in a given state. Second, the results reported in Table 8 show that the effect of men's land title ownership is not statistically significant for Odisha, lending support to the fact that this state is a lot more socially progressive than the other three states. On the other hand, men's land title has a positive and significant effect on women's participation in only few family decisions in the cases of Bihar, Uttar Pradesh, and West Bengal (see Tables 7, 9, and 10). This may reflect the fact that the caste system remains strong in these states.

VI. CONCLUSION

This paper has examined the effect of women's land title ownership on their participation in various decision-makings using a unique rural household survey from four Indian states, namely Eastern Uttar Pradesh, Bihar, Odisha, and West Bengal. The 2005 HSA was legislated to protect women's rights to an equal share in ancestral property, including land. The issue that we addressed in this paper is twofold. First, we addressed how the extent of involvement of women in family decisions can be measured from the perspective of women in rural areas. In doing so, we used a tailor-made sex-disaggregated measurement of individuals' input into decisions about 10 household activities to understand the mechanism underlying women's participation and influence in household decisions. From a policy evaluation perspective, the second issue that we addressed is related to the 2005 HSA. In doing so, we classified land titles registered under men's and women's names relative to individuals with no land title to shed new light on the impact of land rights on women's empowerment. We contribute to the literature on land rights and intrahousehold dynamics by providing evidence that women's land titles matter for increasing their participation in family decisions and thus give them more empowerment.

The findings of this study point to the importance of gender equity in land rights where women's land title ownership enhances their status and decision-making power in the household. However, we also found that the impact of women's land title ownership on women's participation in family decision-makings varies across states, which can be influenced by the awareness of the people about the legal provisions for inheritance and the implementation of inheritance rights. Therefore, addressing the possibility of slow and/or weak implementation of inheritance law and policies that allow gender equity in inheritance rights could potentially lead to increase women's decision-making influence in the household, particularly in rural areas where agriculture is the major source of livelihood for women. Another way to enable women in rural areas to have a greater say in family decision-making is to provide them with more education. We found that women's education was important in enabling them to participate in decisions about nonfarm activities, household expenditure, and farming. This finding suggests that providing women with more education and giving them access to on- and off-farm employment opportunities could increase their status in the family in terms of decision-making.

Table 7: Instrumental Variable Results for Women's Participation in Decision-Making in Bihar

	Farm Decisions				Livelihood Decisions		Household Decisions			
	Crop Selection	Variety Selection	Crop Production	Cash Crop Farming	Livestock Raising	Nonfarm Activities	Major Expenditure	Minor Expenditure	Children's Schooling	Family Planning
Land title										
Women's land title	−10.6999	−9.5648	−16.6573	−7.4172	11.6255	−21.1239	30.0670	−2.2101	13.1301	12.7134
	(8.205)	(7.623)	(11.209)	(6.157)	(8.789)	(15.023)	(32.261)	(1.385)	(9.965)	(10.208)
Men's land title	−0.1118***	−0.1259***	−0.1339**	−0.0352	0.5579*	−0.0886**	0.0363	0.1227***	−0.0155	−0.0358
	(0.042)	(0.040)	(0.060)	(0.062)	(0.314)	(0.041)	(0.125)	(0.031)	(0.053)	(0.061)
Characteristics of female respondents										
Age	−0.0009	−0.0008	−0.0009	0.0017	0.0007	0.0005	0.0003	−0.0004	0.0002	0.0021
	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)
Schooling	−0.0074	0.0049	−0.0043	−0.0563	0.0107	0.0384	0.1163	−0.0053	0.1097	0.1274
	(0.044)	(0.041)	(0.061)	(0.055)	(0.127)	(0.046)	(0.130)	(0.020)	(0.069)	(0.079)
Head (=1)	0.1636**	0.1611***	0.1833**	0.1130	−0.0370	0.0378	0.0305	−0.2773***	0.1038**	0.0102
	(0.064)	(0.060)	(0.088)	(0.080)	(0.360)	(0.058)	(0.127)	(0.028)	(0.052)	(0.062)
Spouse (=1)	0.2184*	0.2393**	0.3280**	0.2890**	−10.5493	0.1184	0.3831**	0.0022	0.6655***	0.4043***
	(0.114)	(0.107)	(0.156)	(0.143)	(8.518)	(0.108)	(0.152)	(0.027)	(0.076)	(0.090)
Parent (=1)	0.2498*	0.2353	0.3453	−0.0708	−0.5144	0.1325	−0.0829	0.0164	−0.1640	−0.1743
	(0.149)	(0.140)	(0.218)	(0.105)	(0.553)	(0.150)	(0.366)	(0.037)	(0.280)	(0.200)
Household characteristics										
Land size (ha)	−0.0373**	−0.0266*	−0.0243	−0.0988***	−0.0563	0.0145	−0.0343	0.0338	−0.0859	−0.1227
	(0.016)	(0.015)	(0.022)	(0.019)	(0.045)	(0.018)	(0.034)	(0.022)	(0.087)	(0.116)
Migration (=1)	0.0335	0.0250	0.0783	0.1214*	0.0171	−0.0233	−0.0723	−0.0162	−0.0105	−0.0513
	(0.060)	(0.056)	(0.083)	(0.066)	(0.109)	(0.052)	(0.131)	(0.023)	(0.066)	(0.095)
Below poverty line (=1) card	−0.0150	−0.0162	−0.0090	0.0773	0.0786	−0.0735**	0.0648	0.0623***	-0.0439	-0.0755
	(0.029)	(0.027)	(0.040)	(0.048)	(0.093)	(0.029)	(0.061)	(0.015)	(0.047)	(0.079)
Social group										
Scheduled caste (=1)	0.0340	0.0559	-0.0197	-0.0436	0.0052	0.0828**	-0.0154	-0.0829***	0.0372	0.0547
	(0.044)	(0.042)	(0.063)	(0.069)	(0.110)	(0.042)	(0.106)	(0.022)	(0.051)	(0.062)
Scheduled tribe (=1)	0.0979	0.1091	-0.0344	-0.0518	-0.2037	0.0607	-0.2258	-0.2058***	-0.0676	0.1606
	(0.145)	(0.137)	(0.207)	(0.271)	(0.329)	(0.117)	(0.254)	(0.059)	(0.136)	(0.150)
Other backward classes (=1)	0.0235	0.0345	0.0310	−0.1029**	−0.3083***	0.0773**	−0.1933**	−0.0585***	0.0177	0.0549
	(0.030)	(0.029)	(0.042)	(0.048)	(0.103)	(0.034)	(0.089)	(0.016)	(0.043)	(0.044)
Constant	0.1399**	0.1299**	0.1884**	0.4142***	0.2122	0.2652***	0.2616	1.0040***	0.2410**	0.5084***
	(0.069)	(0.065)	(0.095)	(0.087)	(0.543)	(0.067)	(0.162)	(0.035)	(0.098)	(0.101)
No. of observations	1,576	1,571	1,539	1,137	555	2,778	2,075	2,102	1,820	1,297

ha = hectare.

Notes: Standard errors in brackets. ***, **, and * significant at the 1%, 5%, and 10%, respectively. Base category for land title is individual with no land title. Base category for relationship to household head is children. Migration is dominated by male migrants.

Source: Authors' calculations based on data from IRRI. 2016. *Rice Monitoring Survey 2016 in India.* Los Baños, Philippines.

Table 8: Instrumental Variable Results for Women's Participation in Decision-Making in Odisha

	Farm Decisions				Livelihood Decisions		Household Decisions			
	Crop Selection	Variety Selection	Crop Production	Cash Crop Farming	Livestock Raising	Nonfarm Activities	Major Expenditure	Minor Expenditure	Children's Schooling	Family Planning
Land title										
Women's land title	4.8750**	7.8860**	3.8012	3.0025	3.9617**	7.3537*	7.6414**	1.2883**	9.2029**	1.4294
	(2.143)	(3.228)	(2.520)	(3.220)	(1.742)	(4.048)	(3.304)	(0.605)	(4.459)	(1.917)
Men's land title	0.0531	0.0787*	0.6973	0.0397	0.0404	0.0432	0.0256	0.0132	0.0665	−0.0037
	(0.040)	(0.048)	(0.511)	(0.057)	(0.033)	(0.055)	(0.047)	(0.016)	(0.054)	(0.031)
Characteristics of female respondents										
Age	−0.0018*	−0.0028**	−0.0043**	−0.0007	−0.0014	−0.0033**	−0.0021	−0.0015***	0.0002	−0.0011
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)
Schooling	−0.0167	0.0248	−0.1459	0.0121	0.0091	0.0161	0.0227	−0.0140	0.0190	0.0010
	(0.027)	(0.037)	(0.119)	(0.060)	(0.026)	(0.026)	(0.033)	(0.012)	(0.042)	(0.023)
Head (=1)	0.1658**	0.0950	0.4620	0.0269	−0.0145	0.0884*	0.0837	0.0250	0.0842	−0.0194
	(0.064)	(0.077)	(0.281)	(0.100)	(0.049)	(0.048)	(0.059)	(0.020)	(0.068)	(0.036)
Spouse (=1)	0.2932***	0.1868*	−2.4245	0.0551	0.1195**	0.1904**	0.1453*	0.0883***	0.1902***	0.0610*
	(0.081)	(0.105)	(2.195)	(0.135)	(0.047)	(0.078)	(0.0870)	(0.020)	(0.058)	(0.037)
Parent (=1)	−0.7654**	−0.4773**	−0.0557	0.0590	−0.4012**	−0.1207	−0.9273**	0.0265	−0.5792*	0.1115
	(0.385)	(0.217)	(0.497)	(0.186)	(0.171)	(0.136)	(0.444)	(0.042)	(0.337)	(0.158)
Household characteristics										
Land size (ha)	−0.0117	−0.0330	0.0405	−0.0092	−0.0270*	−0.0489**	−0.0326*	−0.0088	−0.0650*	0.0013
	(0.018)	(0.023)	(0.029)	(0.024)	(0.014)	(0.024)	(0.020)	(0.008)	(0.035)	(0.015)
Migration (=1)	0.0347	0.0083	0.0647	−0.1827***	0.0183	−0.0329	−0.0325	−0.0102	−0.0022	0.0523
	(0.038)	(0.046)	(0.069)	(0.066)	(0.031)	(0.038)	(0.042)	(0.015)	(0.048)	(0.033)
Below poverty line (=1) card	0.0339	0.0270	−0.0375	0.0321	0.0053	0.0278	0.0370	0.0228**	0.0378	0.0155
	(0.031)	(0.034)	(0.051)	(0.043)	(0.022)	(0.024)	(0.029)	(0.011)	(0.037)	(0.023)
Social group										
Scheduled caste (=1)	−0.0369	−0.0551	0.1552	0.0003	−0.0405	0.0210	−0.0268	−0.0533**	−0.0074	−0.0510
	(0.050)	(0.060)	(0.100)	(0.086)	(0.041)	(0.044)	(0.055)	(0.022)	(0.061)	(0.041)
Scheduled tribe (=1)	0.0615	0.0132	0.1178	0.0792	−0.0743*	0.0880*	−0.1691***	−0.0489***	0.0448	−0.0770**
	(0.045)	(0.059)	(0.093)	(0.077)	(0.041)	(0.045)	(0.053)	(0.018)	(0.057)	(0.037)
Other backward classes (=1)	−0.0069	0.0035	0.0947	0.0455	−0.0474	0.0119	−0.0669	−0.0196	0.0149	−0.0778*
	(0.044)	(0.051)	(0.080)	(0.073)	(0.036)	(0.039)	(0.044)	(0.017)	(0.051)	(0.040)
Constant	0.6056***	0.7283***	−0.2932	0.7756***	0.9715***	0.7020***	0.7374***	0.9768***	0.7301***	1.0060***
	(0.085)	(0.106)	(0.444)	(0.145)	(0.065)	(0.090)	(0.087)	(0.031)	(0.107)	(0.093)
No. of observations	2,241	2,236	541	452	1,846	3,612	2,579	2,705	1,691	1,030

ha = hectare.

Notes: Standard errors in brackets. ***, **, and * significant at the 1%, 5%, and 10%, respectively. Base category for land title is individual with no land title. Base category for relationship to household head is children. Migration is dominated by male migrants.

Source: Authors' calculations based on data from IRRI. 2016. *Rice Monitoring Survey 2016 in India.* Los Baños, Philippines.

Table 9: Instrumental Variable Results for Women's Participation in Decision-Making in Uttar Pradesh

	Farm Decisions				Livelihood Decisions		Household Decisions			
	Crop Selection	Variety Selection	Crop Production	Cash Crop Farming	Livestock Raising	Nonfarm Activities	Major Expenditure	Minor Expenditure	Children's Schooling	Family Planning
Land title										
Women's land title	14.4391*	11.3449*	23.2788*	−7.5401	7.7703*	13.7075**	8.2561*	10.4451*	13.8980**	5.7358*
	(7.925)	(6.602)	(13.908)	(6.185)	(4.690)	(6.058)	(4.337)	(5.352)	(6.144)	(3.376)
Men's land title	0.2148	0.1283	0.3053	−0.0361	0.2667**	0.2021**	0.1865**	0.4174***	0.2219**	0.0545
	(0.135)	(0.110)	(0.220)	(0.063)	(0.107)	(0.102)	(0.074)	(0.144)	(0.106)	(0.067)
Characteristics of female respondents										
Age	−0.0072**	−0.0027	−0.0057	0.0017	−0.0003	−0.0037	−0.0027*	−0.0049	−0.0050*	0.0022
	(0.003)	(0.002)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)
Schooling	0.1461	0.1422	0.3403	−0.0565	0.0207	0.1868*	0.0492	0.0636	0.1080	−0.0323
	(0.096)	(0.103)	(0.228)	(0.055)	(0.074)	(0.109)	(0.065)	(0.086)	(0.120)	(0.063)
Head (=1)	−0.1782	−0.1521	−0.1725	0.1138	−0.2900**	−0.0419	−0.0454	−0.2074	−0.0689	−0.3142***
	(0.150)	(0.127)	(0.234)	(0.081)	(0.120)	(0.091)	(0.079)	(0.126)	(0.115)	(0.062)
Spouse (=1)	0.0463	-0.0738	−0.1404	0.2890**	0.1911	0.0934	0.0869	0.2050*	0.3888***	0.0114
	(0.177)	(0.164)	(0.280)	(0.143)	(0.118)	(0.133)	(0.098)	(0.106)	(0.122)	(0.067)
Parent (=1)	−0.4049	−0.3211	−0.1540	−0.0705	−0.6171	−0.0073	−0.1668	−1.0912*	−1.2401*	−0.9761*
	(0.251)	(0.204)	(0.326)	(0.105)	(0.400)	(0.137)	(0.137)	(0.620)	(0.638)	(0.523)
Household characteristics										
Land size (ha)	−0.0246	−0.0361	−0.0285	−0.0989***	−0.0133	0.0141	−0.0161	0.0256	0.0128	−0.0054
	(0.028)	(0.024)	(0.044)	(0.019)	(0.027)	(0.019)	(0.018)	(0.031)	(0.032)	(0.021)
Migration (=1)	0.1151*	0.1275**	0.2187**	0.1221*	0.0457	0.0308	0.0376	0.1742**	0.0413	−0.0069
	(0.067)	(0.057)	(0.109)	(0.066)	(0.061)	(0.046)	(0.042)	(0.078)	(0.078)	(0.054)
Below poverty line (=1) card	0.0945	0.0975	0.2293	0.0778	0.1272**	0.1796**	0.0795	0.1194**	0.1728*	0.0149
	(0.087)	(0.084)	(0.168)	(0.048)	(0.066)	(0.071)	(0.059)	(0.055)	(0.097)	(0.048)
Social group										
Scheduled caste (=1)	−0.0511	0.0247	0.0960	−0.0444	−0.0137	0.0173	−0.0567	−0.0094	−0.2223*	−0.0081
	(0.107)	(0.097)	(0.193)	(0.070)	(0.104)	(0.077)	(0.063)	(0.105)	(0.128)	(0.083)
Scheduled tribe (=1)	0.1416	0.1727	0.2391	−0.0530	0.3862	0.1232	−0.0832	0.4452	0.0571	0.0614
	(0.272)	(0.236)	(0.451)	(0.272)	(0.311)	(0.230)	(0.183)	(0.307)	(0.322)	(0.445)
Other backward classes (=1)	−0.1764**	−0.1053*	−0.1067	−0.1035**	0.0225	−0.0866*	−0.0658	−0.0119	−0.1288	0.0410
	(0.083)	(0.059)	(0.116)	(0.048)	(0.072)	(0.052)	(0.044)	(0.085)	(0.081)	(0.058)
Constant	0.5969***	0.2604	0.1343	0.4139***	0.4590***	0.1756	0.2056*	0.7472***	0.4349*	0.6775***
	(0.180)	(0.17)	(0.342)	(0.087)	(0.134)	(0.131)	(0.114)	(0.136)	(0.222)	(0.139)
No. of observations	1,628	1,625	1,602	1,137	1,294	2,953	1,794	1,813	1,663	1,011

ha = hectare.

Notes: Standard errors in brackets. ***, **, and * significant at the 1%, 5%, and 10%, respectively. Base category for land title is individual with no land title. Base category for relationship to household head is children. Migration is dominated by male migrants.

Source: Authors' calculations based on data from IRRI. 2016. *Rice Monitoring Survey 2016 in India.* Los Baños, Philippines.

Table 10: Instrumental Variable Results for Women's Participation in Decision-Making in West Bengal

	Farm Decisions				Livelihood Decisions		Household Decisions			
	Crop Selection	Variety Selection	Crop Production	Cash Crop Farming	Livestock Raising	Nonfarm Activities	Major Expenditure	Minor Expenditure	Children's Schooling	Family Planning
Land title										
Women's land title	5.3422**	5.1920***	3.3596***	4.5945**	−0.3599	1.7734***	1.7816	0.7168	5.6125***	3.0422
	2.3330	1.9270	1.0890	2.1300	0.2870	0.6820	1.3400	0.5100	1.9280	2.2630
Men's land title	0.1977	0.1801*	0.1461**	0.1107	−0.0096	0.0281	−0.0070	0.0698**	0.0775*	0.0544
	0.1280	0.1070	0.0630	0.0810	0.0250	0.0280	0.0320	0.0290	0.0450	0.0530
Characteristics of female respondents										
Age	−0.0029	−0.0038	−0.0034*	−0.0034	−0.0008	0.0005	−0.0011	−0.0013*	−0.0025	0.0014
	0.0030	0.0020	0.0020	0.0020	0.0010	0.0010	0.0010	0.0010	0.0020	0.0030
Schooling	0.0142	0.0042	0.0074	−0.0096	0.0088	0.0030	0.0086	−0.0140	−0.0405	−0.0052
	0.0520	0.0500	0.0400	0.0450	0.0190	0.0240	0.0280	0.0150	0.0360	0.0400
Head (=1)	−0.0212	−0.0428	0.0891	0.0662	0.0068	0.0376	0.1700***	0.0835***	−0.0341	−0.0354
	0.0950	0.0890	0.0750	0.0820	0.0360	0.0350	0.0400	0.0260	0.0540	0.0380
Spouse (=1)	0.2495	0.1060	0.2770**	−0.4201	0.1251***	0.3140***	0.3837***	0.2257***	0.2121***	0.1314***
	0.2100	0.1860	0.1220	0.3410	0.0330	0.0560	0.0900	0.0260	0.0530	0.0430
Parent (=1)	−0.4154*	−0.5194**	0.1610	−0.1315	0.0932	−0.0841	−0.1087	0.1492***	−0.6479	0.1325
	0.2220	0.2320	0.1640	0.2780	0.0570	0.1120	0.1410	0.0520	0.3960	0.2170
Household characteristics										
Land size (ha)	−0.0961	−0.1019*	−0.0802*	−0.1121**	−0.0218	0.0333	−0.0156	−0.0134	−0.1739**	−0.0666
	0.0610	0.0560	0.0460	0.0500	0.0220	0.0360	0.0370	0.0210	0.0670	0.0410
Migration (=1)	−0.1064	−0.0964	−0.0643	−0.2005**	0.0052	−0.0510	−0.0042	−0.0341	0.0288	−0.0443
	0.0800	0.0760	0.0630	0.0940	0.0230	0.0320	0.0390	0.0210	0.0450	0.0520
Below poverty line (=1) card	0.1109**	0.1304***	0.0180	0.0673	0.0353**	0.0515**	0.1097***	0.0244*	−0.0110	0.0098
	0.0460	0.0460	0.0380	0.0420	0.0170	0.0220	0.0260	0.0140	0.0310	0.0280
Social group										
Scheduled caste (=1)	0.0980	0.0952*	0.0383	0.0715	0.0040	0.0447*	−0.0193	−0.0056	−0.0140	0.0097
	0.0580	0.0560	0.0430	0.0470	0.0190	0.0250	0.0280	0.0150	0.0340	0.0310
Scheduled tribe (=1)	−0.0390	0.0409	0.0256	−0.0700	0.0079	0.0773**	0.0065	0.0167	0.0028	−0.0483
	0.0960	0.0800	0.0650	0.0870	0.0260	0.0340	0.0410	0.0240	0.0490	0.0420
Other backward classes (=1)	0.0499	0.0646	0.0512	0.0251	−0.0300	0.0392	0.0101	0.0008	0.0571	0.0715
	0.0780	0.0760	0.0650	0.0730	0.0310	0.0390	0.0470	0.0250	0.0560	0.0550
Constant	0.2868**	0.3462***	0.4997***	0.4296***	0.8793***	0.5296***	0.4015***	0.8053***	0.8894***	0.7953***
	0.1120	0.1070	0.0880	0.1050	0.0420	0.0520	0.0600	0.0310	0.0840	0.1300
No. of observations	1,311	1,304	1,296	1,078	1,336	2,216	1,756	2,016	1,238	1,017

ha = hectare.

Notes: Standard errors in brackets. ***, **, and * significant at the 1%, 5%, and 10%, respectively. Base category for land title is individual with no land title. Base category for relationship to household head is children. Migration is dominated by male migrants.

Source: Authors' calculations based on data from IRRI. 2016. *Rice Monitoring Survey 2016 in India.* Los Baños, Philippines.

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Women's Land Title Ownership and Empowerment: Evidence from India

This paper examines how women's participation in family decision-making is affected by land rights in rural areas in India. The 2005 Hindu Succession Act was legislated to protect women's rights to an equal share in ancestral property, including land. A unique rural household survey in Eastern Uttar Pradesh, Bihar, Odisha, and West Bengal was conducted, in which both enumerators for interviews and participants of the survey were women. It was found that only 3% of the 8,000 rural households randomly selected in those four states have their land registered under women's names. Women's land title ownership has positive effects on their participation in decisions about farming, livelihood, and household activities.

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