

**These Rights Have No Use? Forest Land Rights and the
Economic and Subjective Wellbeing of Indigenous People in India**

by

Melissa Woytek Rice

A thesis submitted
in partial fulfillment of the requirements
for the degree of Master of Science
(Natural Resources and Environment)
at the University of Michigan
August 2017

Thesis Committee:

Professor Arun Agrawal, chair
Professor Robyn Meeks
Professor Rebecca Hardin

ABSTRACT

The formalization of rural people's rights to agricultural and forest land is a key policy focus for many developing countries (Larson et al. 2010; Deininger and Hilhorst 2013). These reforms can improve marginalized people's wellbeing by securing their hold on durable income-yielding assets, especially where land ownership is culturally prized (Holden et al. 2013; Lawry et al. 2014). However, other studies suggest that formalizing *de facto* land tenure may have negligible or detrimental effects, both economic and subjective (Sjaastad and Cousins 2008; Bose 2011, 2013). India's Forest Rights Act of 2006 formalizes the rights of indigenous people to the government forestland that they have been using illegally (Government of India 2006). To estimate the results of this major reform, the author and her research assistant conducted 200 household surveys and 42 interviews with indigenous farmers in Gujarat, India.

Although the Forest Rights Act is one of the most thorough attempts at forest tenure reform in South Asia, there is little published research on its results. This paper uses regression models complemented by qualitative data to estimate the effects of formal forestland rights on households' economic outcomes and subjective life satisfaction. Logistic regressions indicate a strong correlation between indigenous households' land rights and access to government benefits. According to these models, a household with formal land rights was 8.9% more likely to have received a subsidized borewell, and 16.5% more likely have received a home renovation subsidy, than an identical household without rights ($p=0.041$, $p=0.009$). There was no significant correlation between formal rights and farm income, rights and food security, nor rights and life satisfaction, perhaps due to pre-existing tenure security or the small amount covered by formal rights.

ACKNOWLEDGEMENTS

I am deeply grateful to my advisors Professor Arun Agrawal, Professor Robyn Meeks, and Professor Rebecca Hardin for their guidance and encouragement. They provided me with invaluable resources and taught me both directly and by example as scholars and teachers.

I am indebted to Neelam Kanjani, my research assistant and a gifted social worker. She lived and worked with me for two-and-a-half months. I would have been lost without her interpersonal skills and round-the-clock translation.

I would like to thank our host NGO, the Foundation for Ecological Security (FES), and the 265+ villagers from Santrampur Block, Gujarat, who contributed to this study as respondents. Thank you to Swapnil Yadav, Rahul Bhadoria, Sanjay Khandhar, Naresh Chadar, Biplab Shankar Dey, Deva Gambhalya, and everyone at FES-Santrampur. Thank you to Kishorbhai and Manishbhai for enumeration. Thank you to the hosts who taught me the meaning of *Atithi Devo Bhava*: Kanukaka, Heerabhai, Surtaben, Leelaben, Heerakaka, Lalitaben and Maganbhai, and the Kanjani family.

On the US side, I would like to thank Abhishek Desai, Dhara Patel, and Shivani Patel for assistance with interview transcription and Kevin Hall, with data entry. Finally, I am grateful to the International Institute and the SNRE/SEAS Thesis Fund at the University of Michigan for the funding that made this research possible.

CONTENTS

1. Background and Motivation.....	1
1.1 The Forest Rights Act.....	2
1.2 Land Rights, Forest Rights.....	3
2. Methods.....	5
2.1 Site	5
2.2 Sampling.....	6
2.3 Data Collection.....	7
2.4 Analytical Methods.....	8
3. Results.....	9
3.1 Data Summary.....	9
3.2 Bivariate Analyses.....	11
3.3 Logistic Regressions.....	14
3.3.1 Subsidized Borewell Model.....	14
3.3.2 House Renovation Subsidy Model.....	15
3.4 Linear Regressions.....	17
3.4.1 On-farm Income Mode.....	17
3.4.2 Life Satisfaction Score Model.....	18
4. Discussion.....	21
4.1 “These rights have no use!”.....	21
4.2 Pre-existing Tenure Security.....	22
4.3 Size and Productivity of IFR Land.....	23
4.4 Government Benefits.....	24
4.5 Future Research: Intangible Benefits.....	24
4.6 Limitations.....	25
5. Conclusion	26
6. Literature Cited.....	27
7. Appendix: Probit Models	31

These Rights Have No Use? Forest Land Rights and the Economic and Subjective Wellbeing of Indigenous People in India¹

1. BACKGROUND AND MOTIVATION

Formalizing the land rights of the rural poor is a popular poverty alleviation strategy in developing countries, one promoted by development agencies (Nyamu-Musembi 2007; Holden et al. 2013). In addition to strengthening agricultural land tenure, developing nations are also recognizing the forestland rights of indigenous people in the hope of reducing deforestation or improving natural resource management (Larson et al. 2010; Kunz et al. 2016). In 2016 alone, Indonesia, Cameroon, Peru, Liberia, Panama, and Mali transferred rights over forests from their respective central governments to local communities (Hatcher and Luke 2010; Rights and Resources Initiative 2017). The recognition of forest tenure has gained additional urgency as a prerequisite for the equitable implementation of REDD+, a “payment for ecosystem services” scheme (Larson et al. 2013; Naughton-Treves and Wendland 2014; Kunz et al. 2016).

India’s Forest Rights Act of 2006 (FRA) allows the transfer of rights to own and use forestland from the central government to indigenous *adivasi* people and other forest-dwelling people who were using it illegally (Government of India 2006). Prior to the FRA, the government prosecuted those people for farming and living in the forest. The FRA incorporates agricultural and forest tenure reforms: it grants households Individual Forest Rights (IFR)² to the land they were farming or living on as of December 2005, and grants villages a range of Community Forest Rights (CFR), such as the right to harvest non-timber forest products (ibid).

The FRA could improve the lives of 147 million Indians who live in or near forests, one of the largest such populations in the world, but only three papers on its effects have been published thus far (Bose 2011, 2013; Bandi 2015b). My research blends both quantitative and qualitative methods: with a research assistant and two enumerators, I conducted a household survey of 200 IFR applicant households and about 40 interviews in 5 Bhil *adivasi* villages in Gujarat, India. I developed logistic and linear regression models to help isolate the correlation between IFR and the potential outcomes for indigenous people’s wellbeing. Economists have used regression models to study the economic impacts of other formalization efforts (Deininger et al. 2007; Galiani and Scharfgrödsky 2010; Holden and Ghebru 2013), but my models also incorporate a subjective outcome (life satisfaction) and binary outcomes on government benefits. Furthermore, my qualitative data collection allowed me to ground-truth the variables in my models and provide additional context to the results.

¹ Based on an insight from the Forest Rights Act committee president of Village 5 (see 4.1 for original quotation)

² In spite of the name, the land titles are issued in the name of the male and female heads of household and held by their entire household.

1.1 The Forest Rights Act

From the British Raj's 1878 expropriation of the forests until the Forest Rights Act of 2006, India's central government has restricted access to state forestland for economic and environmental reasons (Pradip 2001; Menzies 2007). Marginalized people have continued living farming, and harvesting resources in forests. The areas they have cleared for agriculture have few but remain "government forestland" on paper, identical to standing forest. Without formal rights, forest-dwellers risk fines, crop destruction, beatings, eviction, and assault from the Forest Department, the agency charged with enforcement (Pimple and Sethi 2005; Bandi 2015a). From 2002 to 2010 alone, the government evicted more than 300,000 families from government forestland (Das 2013). Most forest-dwelling people belong to the "Scheduled Tribes," the constitutionally recognized *adivasi* communities that form one of India's most deprived minorities (Xaxa et al. 2014).

In spite of affirmative action programs, Scheduled Tribes suffer from discrimination and extreme deprivation, with literacy lagging 20 percentage points behind the national average and widespread malnutrition and anemia (Xaxa et al. 2014). In Gujarat state, where I conducted this research, infant mortality among Scheduled Tribes is 80% higher than the statewide average (ibid). Instead of increasing *adivasis'* quality of life, industrial projects and wildlife parks in India's remote corners have caused poverty, displacement, and forced assimilation (Menzies 2007).

The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights Act) of 2006, known as the Forest Rights Act, aims to remedy "this historical injustice" and "ensur[e] livelihood and food security of the forest dwelling Scheduled Tribes and other traditional forest dwellers" (Government of India 2006). Since 2008, households have been applying for Individual Forest Rights (IFR), a *de jure* formalization of *de facto* land use. Applicants must demonstrate that they belong to a Scheduled Tribe³ and provide proof of occupation and cultivation on their requested plot since late 2005. The applications are vetted by a village Forest Rights Committee and then reviewed at the *taluka* (block), district, and state level (Bandi 2015a). IFR transfers land ownership from the central government to households and IFR includes the rights to access, manage, and withdraw resources from the land, and to exclude other people from using it (Schlager and Ostrom 1992). However, unlike private land rights, Individual Forest Rights are only alienable by inheritance (Government of India 2006).

³ Non-ST "traditional forest dwellers" have been effectively excluded from IFR implementation due to misinterpretations of the FRA and a higher standard of proof of forest occupation (Sarin 2014).

1.2 Land Rights, Forest Rights

Building on older studies about tenure security and agricultural productivity (Demsetz 1967), de Soto (2000) argued that formal property rights would enhance the poor's access to credit and thus build their wealth. He further claimed that a system of formal rights would improve a developing nation's entire economy by increasing the capital available for investment and simplifying the collection of taxes. His theory underpins many of today's land rights reforms (Nyamu-Musembi 2007; Galiani and Scharrodsky 2010).

Scholars have raised both theoretical and empirical objections to de Soto's theory. For example, many questioned the assumption that formal land title leads to credit, as poor farmers with land title remain unattractive borrowers from a bank's perspective (Gilbert 2002; van der Molen 2012). This theoretical critique has been borne out empirically in studies of tenure reform and credit access (e.g. Perz et al. 2014 on Bolivia) and a systematic review of agricultural property reforms – primarily formalization – in 18 countries (Lawry et al. 2014).

Theorists have pointed out that de Soto's argument redefines “secure tenure” as synonymous with “individual private land rights,” and thus redefines “legal pluralism” as “extra-legal” (Gilbert 2002; Nyamu-Musembi 2007; van der Molen 2016). Formalization supersedes the customary tenure arrangements and social interactions that govern rural land use in practice, resulting in conflict, gaps between *de jure* rights and existing *de facto* rights, and the diminishment of the rights of customary land users (Nyamu-Musembi 2007; Sjaastad and Cousins 2008). Formalization has led to the exclusion of women from land rights they previously enjoyed on the basis of family relationships or other customary roles, in India and abroad (Bose 2011, 2013; Nyamu-Musembi 2007; Ossome 2014; Lawry et al. 2014).

Finally, prioritizing formalization over the actual redistribution of land reifies the *status quo* (Nyamu-Musembi 2007; van der Molen 2016). Land-poor people remain land-poor, their formal title limited to the land over which they already had *de facto* control. In India, for example, the average approved IFR plot is just .63-.69 acres⁴ (CFRLA 2016, 44); gaining rights to such modest amounts of land may not yield measurable improvements in wellbeing. Furthermore, local elites may capture the formalization process and use it to their own benefit, as seen with the IFR in India (Sjaastad and Cousins 2008; Bandi 2015). Redistribution of land is comparatively more beneficial. In India, the economic and human capital benefits of agrarian tenancy reform paled in comparison to the benefits of redistributive reforms (Deininger et al. 2007).

However, many impact evaluations, which employ cross-sectional and panel data to make causal inferences,⁵ have found that formalizations helps the poor accumulate wealth. Studies from China, Thailand, Latin America, Eastern Europe, and Africa have shown that rural people's investment in agricultural land and agricultural assets increases with greater tenure security (Holden et al. 2013; Narh et al. 2016). Lawry et al. (2014) synthesized nine qualitative studies and 20 impact evaluations and found that formalization increased

⁴ Data from MoTA and CRFLA reports as of July 2016. Means calculated assuming normal distribution.

⁵ Gertler et al. 2011.

agricultural productivity and household consumption or income, except in Africa. A direct comparison of earlier Indian tenure reform to the FRA is difficult because those interventions also include a degree of redistribution (Deininger et al. 2007, Lawry et al. 2014).

There are few published studies the results of the Forest Rights Act. Using panel data on IFR applicants, Bandi (2015b) found that *adivasis* in Gujarat experienced a modest increase in cereal and oilseed yields after receiving IFR. However, he attributes those improvements to secular trends like improved irrigation. In Rajasthan, just across the state border from my field site, Bhil *adivasis* did not perceive any livelihood benefits from IFR (Bose 2013). They applied for IFR not to improve their livelihood but to force the government to acknowledge them as citizens, deserving the socioeconomic rights guaranteed by Indian law and fulfilled through government benefits (ibid; Das 2013). IFR created tenure insecurity for customary rights holders, namely Bhil women and nomads from other tribes (Bose 2011, 2013). Upon converting their own *de facto* claim into a *de jure* IFR title, the male heads of household began excluding female users who were previously guaranteed access through marriage, kinship, and group membership (ibid). Instead of the joint male-female titles stipulated by law, states usually issued IFR titles in the name of the male only (Sarin 2014).

2. METHODS

2.1 Site

This study took place in five *adivasi* villages in the semi-arid hills of Santrampur Block, Mahisagar District, Gujarat, India. Gujarat was one of the first states to begin the IFR process, allowing time for potential benefits to become visible (Holden and Ghebru 2013, Lawry et al. 2014; CFRLA 2016). I selected these particular villages because they are homogenous in population. Nearly all residents are subsistence farmers from the Bhil Scheduled Tribe (Director 2011). Most importantly, many villagers filed IFR claims, and some households have received IFR titles while their neighbors have not. Finally, these villagers have excellent relations with my host NGO FES; this allowed me to create a rapport with my respondents and even live with (non-respondent) host families.

The villages' populations range from 1,100 to 2,500 (Table 1). They are one hour from Santrampur, a city of 19,000, and 45 minutes from the nearest bank or secondary school. Although adjacent to a reservoir,⁶ villagers have no access to its water for irrigation and no plumbing. Their homes and the adjacent fields are dispersed along valleys (Image 1, 2). The clusters of households, known as *faliya*, may be a kilometer apart. Steep hills surround each valley, covered by government forestland that is partly deforested and even under cultivation (Image 1, 2). There is also some forestland in the valleys themselves.



Image 1: View of part of a *faliya* (by author)

Table 1: Village population and IFR approval rates

Village ID	Population ⁷	% Bhil Scheduled Tribe ⁸	No. of Applicant HHs	No. HHs approved	% of HHs approved
Village 1	1,080	100%	97	71	73.20%
Village 2	1,481	>99.01%	78	57	73.08%
Village 3	1,362	100%	211	40	18.96%
Village 4	2,504	>98.72%	193	163	84.46%
Village 5	1,295	100%	81	3*	3.70%* ⁹

⁶ The reservoir flooded most of Village 4 in the 1980s. The displaced families resettled and reformed the village on the reservoir's hilly banks, which are covered in forestland. In the 1980s, they successfully resisted government attempts to prevent them from clearing and plowing that land.

⁷ Director 2011

⁸ Director 2011. Note: The non-ST population belongs to Scheduled Castes: 8 people in Village 2 and 32 in Village 4.

⁹ Most applicants in this village were claiming land they had not farmed; therefore, they were ineligible for IFR



Image 2: Satellite image of typical villages in Santrampur Block

The oblong patches of brown are the villages, filled with fields and surrounded by hills. Each village we sampled spans multiple valleys and has at least 4 *faliyas*. (Google Earth)

2.2 Sampling

My research assistant Neelam Kanjani and I lived in each village for one to two weeks as guests of local families, conducting our surveys and interviews (Image 3). Due to field conditions, I could not select a simple random sample from a master-list of all IFR applicants. With support from our host NGO Foundation for Ecological Security (FES) we met with officers of the Forest Rights Committees that oversaw the IFR process in their communities. We compiled 5 village-wise lists of IFR applicants from their handwritten records.



Image 3: View from one host family's house

My goal was to have the same number of unapproved and approved households in the total sample and, if possible, in each village. We found in the course of our research that villages had different approval rates (Table 1). Therefore, I randomly selected 32-47 households per village for a total of 200¹⁰ households, 42% of them approved¹¹ (Table 2). Ms. Kanjani and I

¹⁰ Originally 202. I excluded the household of a wealthy *sarpanch* (village president) and a *dalit* (Scheduled Caste) household. As the only *dalit* family in the village, the latter family face discrimination: "The villagers practice untouchability. They won't drink water we offer, let us use the bathroom, or even let our animals graze near their houses"

personally conducted 134 of these surveys and a two-person enumeration team¹² conducted the remaining 66.

Table 2: Sample composition and IFR approval rates

Village ID	No. Households surveyed	% of total sample	No. HHs not approved	No. HHs approved	% of sample approved
Village 1	40	20%	18	20	50%
Village 2	43	22%	17	26	59%
Village 3	38	19%	20	18	47%
Village 4	47	23%	22	25	53.2%
Village 5*	32	16%	29	3*	9.36%*
Total	200	100%	106	94	48%

*Note: Only 3 households in the whole village received land rights

2.3 Data Collection

The household survey captured information on each individual, including their age, education, employment, and migration; and household-level information on: IFR, private land ownership, and participation in local groups and committees.¹³ I included three economic variables associated with the formalization of land rights in the literature: assets, income, and food security. I based the survey on a survey from International Forestry Resources and Institutions (IFRI), which has been used in over 50 studies, and the Multidimensional Poverty Index (IFRI 2013; Alkire and Santos 2014).

The survey also asked if the responding household had received a variety of government benefits in the preceding year; these benefits may influence economic outcomes or be the results of the law, since it legitimizes people's once-illegal behavior and provides essential proof of land ownership (Bose 2011, 2013; Das 2013). I added to the survey two open-ended questions about the Forest Rights Act, asking respondents why applications were rejected and what benefits IFR titles would or had brought them. Finally, I added an assessment of subjective wellbeing because formalization laws like FRA may yield subjective improvements in people's wellbeing (World Bank 2006) and because the documented negative effects of such laws are primarily qualitative (Nyamu-Musembi 2007; Bose 2011, 2013). The question was a Cantril ladder, asking individual respondents to rate their life satisfaction from 1 to 10 (OECD 2011).

¹¹ I had to discard ~100 surveys and conduct 100 more after other enumerators made up data.

¹² Kishorbhai and Manishbhai, forest rights activists from a Godhra-based NGO

¹³ Our survey was translated into Gujarati, back-translated and checked, and finally re-translated with local input.

My assistant Neelam Kanjani and I conducted 42 semi-structured interviews. We interviewed the officers of the village FRCs and other community leaders about the implementation of the Act, potential reasons for rejection, benefits of the IFR, and relationships with the Forest Department and between villagers before and after the FRA. We also interviewed household members about subjective wellbeing and asked personalized versions of the background questions. I based the household interview guides on an earlier study of wellbeing in *adivasi* communities in India, addressing the domains of health, economics, social connections, and agency (White, Gaines, and Jha 2013). I recorded the gender and age of the individual respondent, since levels of subjective wellbeing vary across different demographic groups (OECD 2013).



Image 4: Asking for directions to the next household on our randomly-generated list

We collected data from May to August 2015, spanning the field preparation and the planting (monsoon) seasons. My research assistant and I stayed in each village during data collection. We and our two enumerators visited each applicant's home in pairs and surveyed them and/or other adult members of their household (Image 4). As per the Government of India census, a "household" included anyone who ate at the same stove as the IFR applicant unless they were away more than six of the preceding 12 months (Shukla 2010).

2.4 Analytical Methods

I conducted bivariate analyses of all the characteristics of IFR and non-IFR households using Chi-squared tests, two-tailed t-tests and, for non-normal data, Wilcoxon rank sums. I then built regression models¹⁴ for the variables that differed significantly between the two groups, such as on-farm income and government subsidies for borewells and house renovation (see Results). I used logistic regression to model the relationship between IFR status and household participation in the two government programs, while controlling for potential confounders such as household-level social capital. I also developed OLS multivariate linear regression models of the relationship between IFR approval and farm income, and IFR and life satisfaction. Finally, I interpreted these results in the light of the interviews and responses to the survey's open-ended questions.

¹⁴ I experimented with Propensity Score Matching but I could not due to a lack of quality panel data and an inability to make the necessary "assumption of conditional independence", i.e. I knew that unobserved variables such as corruption had influenced who received IFR ((Khandker et al. 2009).

3. RESULTS

3.1 Data Summary

94 of the households had received Individual Forest Rights but 106 had not (Table 2). The latter includes households that received notice of rejection and those whose applications were pending. Some households had applied as recently as 2015. Few respondents could recall when they knew they received IFR, and those that did reported delays between notification and receipt of their title documents.¹⁵

The average household had 7 people, with 4 working members (Table 3). Women headed only 11 households, but many individual respondents (~40%) were female.¹⁶ A majority of household heads was illiterate, in contrast to their children and grandchildren. On average, the most educated person per household had some high school education (Table 3).

Nearly every household farmed corn, rice, and other subsistence crops, sometimes complemented by *chana dal*, a cash crop (98.5%). In addition to selling surplus crops, they earned cash through migratory day labor (71.00%), salaried employment (10.50%), and small businesses (Table 3). Private landholdings¹⁷ were extremely small. 50% of the households owned one acre or less – and only one-fifth of that acre was reliably productive and fertile¹⁸ (Table 3). 1.5% of households were landless. The distribution of private land was extremely skewed right due to the presence of a few larger landholders (Fig. 1).

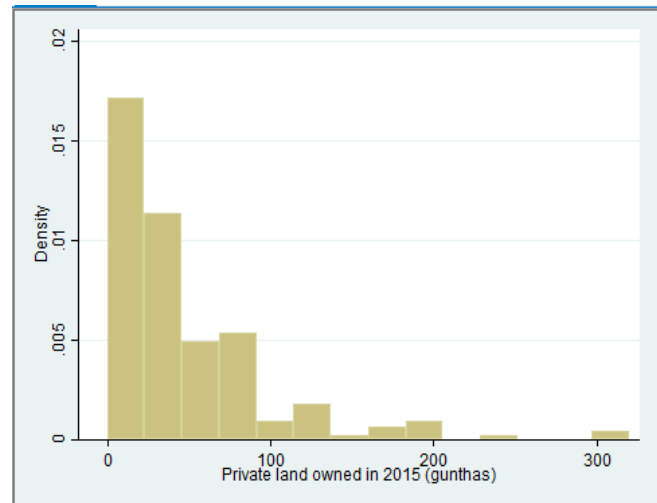


Figure 1: Private landownership in gunthas (1/40th acre) in 2015

In addition to private land, these households had been farming government forestland for decades, a typical situation for *adivasis*.¹⁹ Under the FRA, households can only apply for IFR to the forestland that they were cultivating and/or living on as of late 2005 (Government

¹⁵ Several said they received the title documents personally from then-Chief Minister Narendra Modi at a festival in 2011 or 2013, months or years after being notified of IFR approval. Modi's successor, CM Anandiben Patel, did the same August 2015. An interviewee described these delays as a political ploy, creating the impression that IFR were a gift from this particular political party to *adivasi* voters.

¹⁶ We spoke to 1 or more adults at each household, for a total of ~265 respondents

¹⁷ Private land owned by an individual household member and assigned a survey number.

¹⁸ *Piyat layak*: Arable land with access to water and a gentle slope; i.e. fairly productive. Less fertile land is *binpiyat layak*, arable land that is steep and/or dry, but still used for farming, i.e. low production. Households can "convert" *binpiyat layak* land into *piyat layak* through irrigation and leveling.

¹⁹ particularly in Village 4, where most private land had been flooded by a hydroelectric project in 1980.

of India 2006). 81% of households reported that they had met this criterion, indicating a widespread use of forestland in addition to private land. Households applied for IFR covering anywhere from 1/10 of an acre to 10 acres; the median request was 2 acres (Table 3). Although the law requires IFR titles to be issued in the name of the head of household and his spouse, 90% of applications were in the man's name alone and 2% were joint. The remaining 8% of applicants were female (Table 3). At the time of data collection, more 88% of households reported currently farming and/or living on forestland to which they did not have rights, including households that received IFR covering a fraction of their request and continued farming the whole plot regardless.

The amount of land approved per household was much smaller than requested, with a median of less than 3/4 acre and a distribution strongly skewed to the right (Fig. 2, 3). 25% of approved households received IFR to 0.45 acre or less and 75% received less than 1.25 acres. Only 10% of approved households gained rights over the entire amount for which they applied. When asked why the approved amounts were so small, respondents reported that they did not know, were missing documents, or had refused to pay necessary bribes. Other said that the Forest Department officials had measured their land incorrectly.

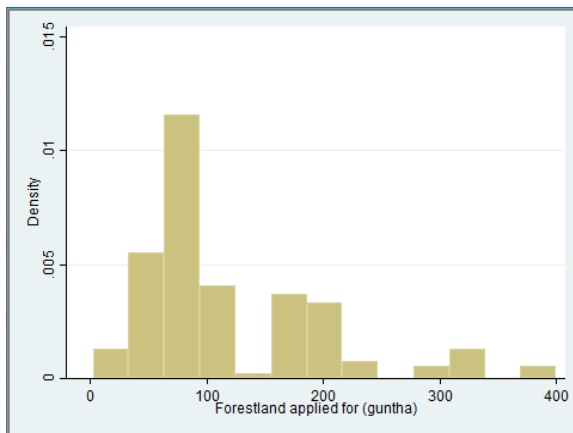


Figure 2: Amount of forestland applied for per household, in units of 1/40th acre (n=178)

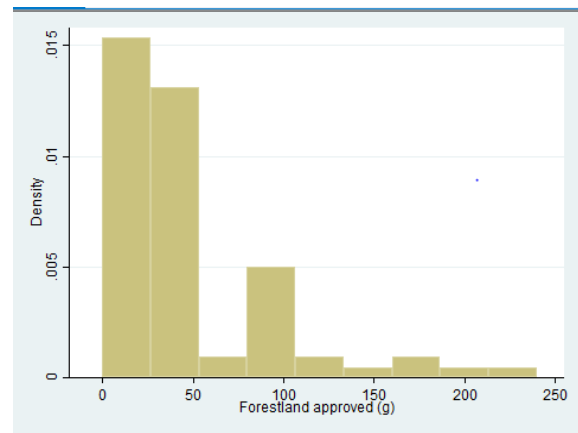


Figure 3: Amount of forestland approved for IFR per household, in units of 1/40th acre (n=88).

Households without IFR reported that they did not know why their claims were rejected or attributed it to: a long processing period, missing documents, corruption, the Forest Department previously preventing them from farming (thereby jeopardizing their eligibility), quarrels between villagers, the death of their household's IFR applicant, or the limited amount of forestland available to be claimed. The "missing document" was often a fine receipt, issued when the Forest Department caught and fined families for illegal cultivation or habitation. The receipts we examined were at least 25 years old. People who had never been caught, or who could not afford to pay the fine, never received them.

Although illegal, the Forest Department in many states has required applicants to present these receipts, with their outdated land measurements, to be considered for IFR²⁰ (Das 2013).

Over 68% of households had experienced problems meeting their food needs in the past year through their own farming and income (Table 4). Migratory day labor was the most common coping mechanism. In 72.14% of households, at one person had migrated temporarily in the past year (Table 3). They spent two weeks to six months outside the village, usually doing day labor. Anyone who had been away for than six months – usually for school or a salaried job – was excluded from the household, as per Indian census procedures (Shukla 2010). When discussing their life satisfaction, respondents disparaged day labor and expressed hopes that increased crop production or salaried employment would render it obsolete.

Only 14.0% of household participated in local groups, such as women’s self-help groups, dairy co-operatives, or the statewide Gujarat Adivasi Federation (Table 3). Some households were home to members of village government committees: the *Gram Panchayat* (village council), the Joint Forest Management Committee, or the Forest Rights Act Committee (FRC). I compared households on the basis of these characteristics, as explained below.

3.2 Bivariate Analyses

Household with and without land rights were extremely similar. There were no significant differences between them in household composition, education, employment, migration, food insecurity, private land ownership, and local group or committee membership (Table 3). Only two variables varied significantly. The group with IFR had applied for significantly more land ($p=0.0046$, Wilcoxon rank sum), and had significantly roomier homes ($p=0.0020$, Wilcoxon rank sum) (Table 3).

There was no correlation between IFR and *Gram Panchayat* membership, nor between IFR and membership in the FRC – surprising considering that such elites have captured the IFR process elsewhere (Bandi 2015a, Das 2013). The FRC officers we interviewed were literate and intimately familiar with the Act, but nonetheless were rejected for IFR. The FRCs reported that they approved nearly all applications, indicating that IFR rejections had occurred at the block, district, or state level committees.

²⁰ The Act itself stipulates that households get IFR for any land cultivate as of 2006.

Table 3: Tests of bivariate relationships between IFR status and key household characteristics

	Summary statistic	All Households	Households without IFR	Households with IFR	P value
Household size (n=200)	Median	6	6 (n=106)	6 (n=94)	0.3508
Female-headed HHs (n=200)	Frequency	11.00%	13.21%	8.51%	0.289
Education (n=200)					
Head's educational attainment (years)	Median	0 (n=200)	2 (n=106)	0 (n=94)	0.6247~~
Highest educational attainment per household (years)	Median	11	11	12	0.5931~~
Head's educational attainment (years) at time of application	Median	0	2	0	0.6605~~
Employment (n=200)					
# of working members ²¹ per household	Median	4 (n=200)	4 (n=106)	4 (n=94)	0.5493 ~, 0.6131~~
HHs with farming members	Frequency	98.51%	97.17%	100%	0.104
HHs with salaried members	Frequency	10.50%	12.26%	8.51%	0.387
HHs with own business	Frequency	4.0%	4.72%	3.19%	0.583
Migration (n=200)					
HH% with migrant members (<i>away less than or equal to 6 months</i>)	Frequency	72.00%	72.64%	71.28%	0.830
Private ²² land ownership					
Fertile ²³ private land (acres)	Median	0.20 n=(197)	0.20 (n=104)	0.15 (n=93)	0.4425~~
Less fertile ²⁴ private land (acres)	Median	0.5 (n=197)	0.5	0.5	0.9629~~
Total private land (acres)	Median	1 (n=197)	0.94	1	0.7603~~
HHs with female IFR applicant	Frequency	8.00% (n=200)	9.43% (n=106)	6.38% (n=104)	0.427
Forestland applied for (acres)	Median	2 (n=178)	2 (n=90)	2.8 (n=88)	0.0046~~**
Forestland approved for IFR rights (acre)	Median		n/a	0.7125 (n=88)	n/a
House conditions (n=200)					
Cement walls and metal roof (<i>pukka</i>)	Frequency	2.01%	1.93%	2.13%	0.911
Room count	Median	3	3	3	0.0282 ~, * 0.0020~~ **
Group membership (n=200)					
% HHs with 1 + group members	Frequency	14.00%	13.83 %	14.15%	0.948
Local government membership (n=200)					
HHs with <i>Gram Panchayat</i> member	Frequency	1.50%	1.89%	1.06%	0.633
HHs with Joint Forest Management committee member	Frequency	10.50%	7.55%	13.83%	0.148
HHs with Forest Rights Act committee member	Frequency	7.00%	5.66%	8.51%	0.430

*significant at .05 level **Significant at .01 level

~ t-test result ~~ Wilcoxon rank sum result (no mark indicates Chi-2 result)

²¹ HH members with primary occupation other than studies, retirement, or convalescence.

²² Private land owned by an individual household member and assigned a survey number.

²³ *Piyat layak*: Arable land with access to water and a gentle slope; i.e. fairly productive.

²⁴ *Binpiyat layak*: Arable land that is steep and/or dry, but still used for farming, i.e. low production. Households can convert *binpiyat layak* land into *piyat layak* through irrigation, re-grading the land, etc.

The IFR and non-IFR households displayed few differences in economic characteristics. There was a statistically significant difference in on-farm income between households according to IFR status ($p=0.0094$) but not in total income ($p=0.5933$). There was not evidence of a significant correlation between IFR status and either the duration or the occurrence of food insecurity ($p=0.8163$, $p=0.1222$).

Table 4: Measures of economic wellbeing and bivariate relationships with IFR status

	Summary statistic	All households	Households without IFR	Households with IFR	Test used	P value
Annual Income (n=200)						
On-farm income (Rs.)	Median	0	0	0	Wilcoxon rank sum	0.0094*
Total Income (Rs.)	Median	12,937.50	11,400	14,725	Wilcoxon rank sum	0.5933
Food insecurity						
HHs with food insecurity	Frequency	68.56% (n=194)	63.81% (n=105)	74.16% (n=89)	Chi-squared	0.1222
Months of food insecurity (out of 12)	Median	2 (n=188)	2.5 (n=102)	2 (n=86)	Wilcoxon rank sum	0.8163

*=significant at .05 level. **=significant at .01 level ***=significant at .001 level

Some households had received government benefits in the year prior to data collection, such as subsidized electric borewells from the *Gram Panchayat*, subsidized seeds from a local NGO-government partnership, irrigation assistance from the state-level Integrated Watershed Management Program (IWMP), field leveling by Gujarat Land Development Corporation, or a house renovation subsidy from the national *Indira Awas Yojana* or *Sardar Awas Yojana* (the Indira Gandhi and Sardar Patel Shelter Projects). Participation ranged from 3% in IWMP to over 27% for the housing subsidy (Table 5). Households with IFR had accessed the borewell and housing subsidies significantly more than households without land rights ($p=0.019$, $p=0.007$, Table 5).

Table 5: Frequency of government benefits and their relationships to IFR status (Chi-squared tests)

% of households that received...	All Households	Households without IFR	Households with IFR	P value
Subsidized borewell	10.55 (n=199)	5.71 (n=105)	15.96 (n=94)	0.019*
Discount seeds	14.65 (n=198)	18.27(n=104)	10.64% (n=94)	0.129
Irrigation assistance	3.02 (n=199)	3.81 (n=105)	2.13 (n=94)	0.489
Leveling of fields	5.53 (n=199)	4.76 (n=105)	6.38 (n=94)	0.617
House renovation subsidy	27.14 (n=199)	19.05 (n=105)	36.17 (n=94)	0.007**

*=significant at .05 level. **=significant at .01 level

3.3 Logistic Regressions

3.3.1 Subsidized Borewell Model

I used logistic regression to model a household's likelihood of receiving a subsidized borewell. My goal was to see if the correlation between IFR and the subsidy (Table 5) persisted after controlling for measures of social and political capital and household characteristics. Given the semi-arid climate, the borewell was highly sought-after in this area. Each village's *Gram Panchayat*, particularly the *sarpanch* (president), oversaw the process of granting these subsidies.

$$p(B) = \frac{1}{1 + e^{-(\beta_0 + \beta_1*IFR + \beta_2*G + \beta_3*JFM + \beta_4*FRC + \beta_5*ED + \beta_6*P)}}$$

Where:

$p(B)$: probability of receiving subsidized borewell; IFR : dummy variable for IFR approval; G : number of groups in which household participates; JFM : dummy variable for membership in Joint Forest Management Committee; FRC : dummy variable for membership in Forest Rights Committee; ED : household head's education (years); P : amount of fertile private land (*guntha*²⁵); and β_0 : constant

The logistic model demonstrates that a positive correlation between IFR rights and participation in the borewell program persists after controlling for measurements of social capital local government participation, education of the household head and wealth (measured by fertile private land) ($p=0.038$, Table 6). The households with IFR are more likely to have also received a borewell, regardless of the social and political resources that would typically influence its access to such programs.

Table 6: Logistic regression model of a household's likelihood of receiving a subsidized borewell (n=196)

Explanatory variables	Coefficient	P value
IFR status	1.099776	0.038*
# of groups	0.5380317	0.128
Member in JFM Committee	-0.5211435	0.565
Member in Forest Rights Committee	0.4032976	0.644
Household's education attainment (years)	-0.0564655	0.264
Fertile ²⁶ private land (<i>guntha</i>)	-0.0225458	0.184
Constant	-2.409769	0.000**
Goodness of fit measures		
Pseudo R-squared	0.0719	-
Percent predicted correctly	89.80%	-

*=significant at .05 level. **=significant at .01 level ***=significant at .001 level

²⁵ 1 *guntha*=1/40 acre

²⁶ *Piyat layak*: Arable land with access to water and a gentle slope; i.e. fairly productive.

This model predicts a household's participation in the borewell program correctly 89.80% of the time (Table 6). A household with IFR is 8.3-9.6% more likely to have received a subsidized borewell than an identical household without IFR ($p=0.027$, $p=0.041$, Table 7). The model was robust, with IFR status having a significant and positive relationship with borewell participation in spite of the addition and subtraction of additional regressors. The relationship was also significant and positive in parallel probit models (Appendix).

Table 7: Marginal effects of IFR other variables on receiving a subsidized borewell

Explanatory variables	Average marginal effect (at means)		Average marginal effect	
	AME at means	P value	AME	P value
IFR status	0.0830802	0.027*	0.0957738	0.041*
# of groups	0.0406445	0.119	0.0468544	0.119
Member in JFM Committee	-0.0393687	0.563	-0.0453837	0.565
Member in Forest Rights Committee	0.0304663	0.644	0.0351211	0.644
Household head's educational attainment (years)	-0.0042656	0.258	-0.0049173	0.266
Fertile private land (<i>guntha</i>)	-0.0017032	0.156	-0.0019634	0.188

*=significant at .05 level. **=significant at .01 level ***=significant at .001 level

To conclude, my data demonstrate a strong link between having IFR and receiving an subsidized borewell recently, but further studies are needed. As documented in Bose 2011, there may be an outright causal link between the two, since IFR legitimizes a once-illegal behavior, and the title documents provide proof that a farmer owns the land on which he or she wishes to have a borewell. The benefits of irrigated land include more reliable harvests, higher yields, and the ability to plant more water-intensive cash crops. An important caveat is that the majority of households with bore wells had not participated in the scheme in the past year (68.1% of households), meaning many villagers borewell with their own money or accessed the subsidy years before.

3.3.2 House Renovation Subsidy Model

I created a logistic regression model to estimate a household's probability of having received a house renovation subsidy under *Indira* or *Sardar Awas Yojana*.

$$p(H) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 * IFR + \beta_2 * G + \beta_3 * JFM + \beta_4 * FRC + \beta_5 * ED + \beta_6 * P)}}$$

Where:

$p(H)$: probability of household receiving a housing subsidy; IFR : dummy variable for IFR approval; G : number of groups in which household participates; JFM : dummy variable for membership in Joint Forest Management Committee; FRC : dummy variable for membership in Forest Rights Committee; ED : household head's education (years); P : amount of fertile private land (*guntha*); and β_0 : constant

I found a positive and significant correlation between having IFR land rights and participation in the housing program(s) ($p=0.009$, Table 8) after controlling for measurements of group membership, local government committee participation, education, and wealth. There was also a significant negative relationship between the educational attainment of the household head and receiving the subsidy ($p=0.008$, Table 8), meaning household heads with lower education were more likely to receive this subsidy. The model was also robust, with IFR status having a significant and positive correlation with the housing subsidy in robustness checks (Appendix).

Table 8: Logistic regression model of a household's likelihood of receiving home renovation subsidy (n=196)

Explanatory variable	Coefficient	P value
IFR status	0.9076547	0.009*
# of groups	-0.08184	0.811
Member in JFM Committee	0.8424624	0.140
Member in Forest Rights Committee	-0.3764958	0.607
Household head's educational attainment (years)	-0.1001423	0.008**
Fertile private land (acres)	0.0000797	0.990
Constant	-1.148336	0.000***
Goodness of fit measures		
Pseudo R-squared	0.0816	-
Percent predicted correctly	73.47%	-

*=significant at .05 level. **=significant at .01 level ***=significant at .001 level

A household with IFR is 16.2-16.9% more likely to have received a housing subsidy than a household without IFR but with the same level of social capital, government participation, education, and wealth ($p=0.007$, $p=0.005$, Table 9). The likelihood of getting this benefit declines by 1.8-1.9% for each additional year of education of a household head ($p=0.006$, $p=0.005$, Table 9).

Table 9: Marginal effects of IFR status and other variables on receiving house renovation subsidy

Explanatory variable	Average marginal effect (at means)		Average marginal effect	
	AME at means	P value	AME at means	P value
IFR status	0.1688269	0.007**	0.162295	0.005**
# of groups	-0.0152225	0.811	-0.0146336	0.811
Member in JFM Committee	0.1567009	0.139	0.1506382	0.133
Member in Forest Rights Committee	-0.0700295	0.607	-0.0673201	0.606
Household head's educational attainment (years)	-0.0186268	0.006**	-0.0179061	0.005**
Fertile private land (<i>guntha</i>)	0.0000148	0.990	=0.0000142	0.990

*=significant at .05 level. **=significant at .01 level ***=significant at .001 level

To conclude, my data demonstrate a strong link between having IFR and receiving a housing subsidy. Some of the 135 households I personally surveyed commented that their house itself was located on forestland, an illegal occupation in the absence of IFR. IFR legalizes these households, opening the door but not necessarily guaranteeing access to this government benefit. I did not distinguish between houses built on private and IFR land; further studies are needed to evaluate causation.

3.4 Linear Regressions

3.4.1 On-farm Income Model

I developed an OLS Multivariate Linear Regression Model income to approximate the relationship between a household's IFR status and its annual on-farm income.

$$\text{On-farm Income} = \beta_0 + \beta_1 * \text{IFR} + \beta_2 * \text{BP land} + \beta_3 * \text{P land} + \beta_4 * \text{IFR land} + \beta_5 * \text{Bore} + \beta_6 * \text{Spray} + \beta_7 * \text{Pump} + \beta_8 * \text{Seed} + \beta_0$$

Where:

IFR: dummy variable for IFR; *BP*: amount of less fertile private land (*guntha*); *P land*: amount of fertile private land (*guntha*); *IFR land*: amount of IFR-approved land²⁷; *Bore*: dummy variable for owning a borewell; *Spray*: dummy variable for fertilize or/pesticide sprayer; *Pump*: dummy variable for irrigation pump; *Seed*: dummy variable for subsidized seeds; and β_0 : constant

Table 10: Multivariate OLS Linear Model for On-farm Income

Explanatory variable	Coefficient	Standard error	P value
IFR status	796.5573	662.4398	0.231
Less fertile private land (<i>guntha</i> ²⁸)	5.06456	7.006494	0.473
Fertile private land (g)	54.22874	14.6784	0.000***
IFR approved land (g)	-8.115114	8.99082	0.368
Borewell	54.98123	587.3201	0.986
Fertilizer/pesticide sprayer	522.9936	854.1016	0.541
Irrigation Pump	1314.547	646.067	0.043*
Subsidized seeds	3596.49	829.9786	0.000***
Constant	-678.8262	563.4502	0.230
<i>Observations used</i>	188 (excludes HHs that answered "don't know" for any of above variables)		
<i>R-squared</i>	.2434		
<i>Adjusted R-squared</i>	.2096		

*=significant at .05 level *** significant at 0.001 level

²⁷ Has value of 0 if the household doesn't have IFR

²⁸ 1 *guntha* = 1/40 acre. I'm using this instead of acres because the land amounts are so low, and it's the term respondents used.

There is a positive but statistically insignificant relationship between a household's on-farm income and IFR status (Table 10). There is a negative but insignificant relationship between income and the amount of IFR land approved. A one-*guntha* increase in a household's fertile private land is associated with a Rs. 54 increase in annual on-farm income ($p \sim 0.000$). According to the model, a household with subsidized seeds is predicted to earn approximately Rs. 3,600 ($p \sim 0.000$) more per year compared to an identical household without those seeds. Having an irrigation pump drawing water from a stream or open well is correlated with a Rs. 1,315 increase ($p = 0.043$). The positive association between the amount of fertile land and income was robust ($p \sim 0.000$) across numerous iterations of the model, when I added variables such as the amount of IFR land. Overall, upon accounting for inputs such as seeds and fertile land, the IFR appears to have had no effect on farm income (Table 10).

However this model's explanatory power is limited. It explains only ~21% to 24% of the variability in actual on-farm income ($R^2 = 0.2434$, adjusted $R^2 = 0.2096$, Table 10) Furthermore, the autocorrelation in its residual plot indicates that additional, unobserved explanatory variables play a major role in a household's on-farm income (Fig. 4).

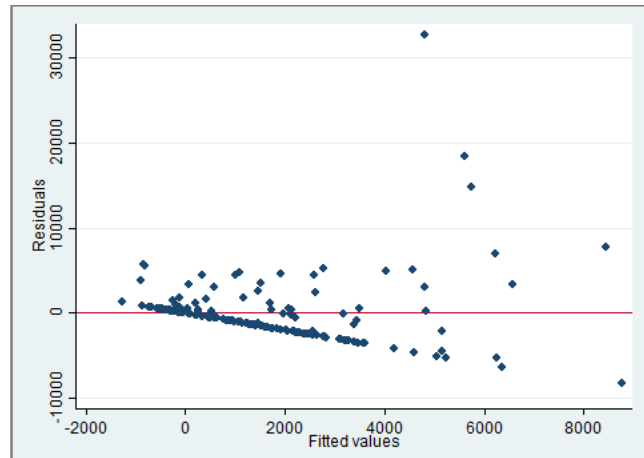


Figure 4: Residual plot for Linear Model for On-farm Income

3.4.2 Life Satisfaction Score Model

I developed an OLS Multivariate Linear Regression Model for an individual respondent's life satisfaction score (1-10) to approximate its relationship with a household's IFR status. Only one respondent in each household answered the life satisfaction question.

$$\text{Life satisfaction} = \beta_1 * \text{IFR} + \beta_2 * \text{BP land} + \beta_3 * \text{P land} + \beta_4 * \text{Sal} + \beta_5 * \text{Day} + \beta_6 * \text{Fan} + \beta_7 * \text{Mob} \dots + \beta_0$$

Where *IFR*: dummy variable for Individual Forest Rights; *BP*: amount of less fertile *binpiyat* private land (*guntha*²⁹); *P*: amount of fertile *piyat* private land (*g*); *Sal*: dummy variable for salaried employees in the household; *Day*: dummy variable for day laborers in the household; *Fan*: number of fans owned; *Mob*: number of mobile phones owned; and β_0 : constant

19

Table 11: Coefficients of Linear Model for Life satisfaction score

²⁹ 1 *guntha* = 1/40 acre. A local unit of measure used in this model because land amounts are so low.

Explanatory variable for Life Satisfaction (1-10)	Coefficient	Standard error	P value
IFR status	-0.4753367	0.2515821	0.060
Less fertile private land (<i>guntha</i> ³⁰)	-0.0027978	0.003036	0.358
Fertile private land (g)	0.0093227	0.0049264	0.060
Salaried employment	0.9853317	0.4167	0.019*
Day labor	-0.5304525	0.2768771	0.057
# of fans	0.5768966	0.2324111	0.014*
# of mobile phones	0.5777731	0.2399079	0.017*
Constant	3.400593	0.3961374	0.000***
<i>Observations used</i>	187 (excludes HHs whose respondents didn't assign a number to their satisfaction)		
<i>R-squared</i>	0.2107		
<i>Adjusted R-squared</i>	0.1799		

There is a negative but insignificant relationship between life satisfaction and IFR status ($p=0.060$) and between anyone in the household doing day labor, an unpopular means of livelihood ($p=0.057$, Table 10). Meanwhile, anyone in the household having salaried employment is correlated with an increase in the respondent's score by 0.985, almost a full point ($p=0.019$). This echoes interviews in which respondents declared they would have more "satisfaction" or "contentment" in life if their educated children could secure a salaried job. Having one additional cell phone or a fan are each correlated with a ~ 0.57 point increase in life satisfaction score ($p=0.014$; $p=0.017$).

However, this linear regression model explains only $\sim 18\text{-}20\%$ of the variability in actual life satisfaction scores ($R^2=0.2107$, adjusted $R^2=0.1799$, Table 10). The strong linear trend and autocorrelation in the model's residual plot indicate that additional, unobserved explanatory variables have major roles in someone's life satisfaction (Fig 5). The literature on life satisfaction and other measures of wellbeing cautions that these are complex concepts, heavily influenced by subjective factors like family harmony and self-efficacy, and concepts of individual versus communal well-being unique to an Indian *adivasi*

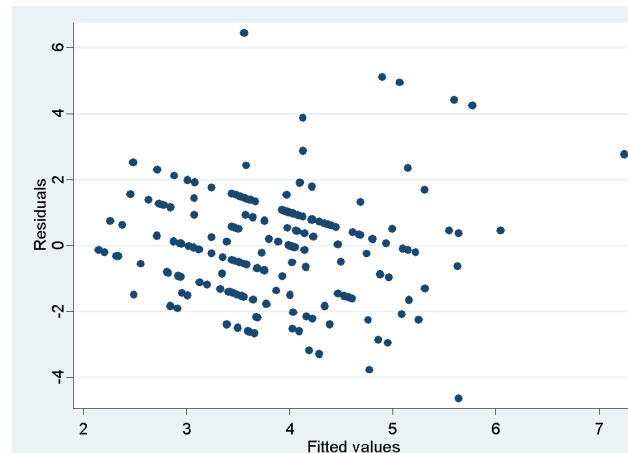


Figure 5: Residual plot for Linear Model for Life Satisfaction

³⁰ 1 *guntha* = 1/40 acre. I'm using this instead of acres because the land amounts are so low, and it's the term respondents used.

community (White, Gaines, and Jha 2013). The lack of correlation between life satisfaction and the respondent's demographic characteristics, which I tested separately, suggests that this may not be a valid measurement of subjective wellbeing (see Limitations).

4. DISCUSSION

4.1 “These rights have no use!”

Overall, *adivasi* households with and without Individual Forest Rights had few statistically significant differences in their economic or subjective wellbeing (Table 3, 10, 11). Although the households with IFR had significantly different on-farm income (Table 3), this relationship was not significant once I factored in the size of fertile private land ($p \sim 0.000$) and access to subsidized seeds ($p \sim 0.000$, Table 10). Furthermore, there was no significant difference in the occurrence of food insecurity nor its duration (Table 3) – even though “ensuring livelihood and food security” is an explicit goal of the Forest Rights Act (Government of India 2006).

In their own words, IFR has provided few economic benefits to the *adivasi* people in these five villages in Santrampur. When asked directly, only a few of the households with IFR reported economic improvement. (Those who did not have IFR did anticipate improvements in agricultural production). Even the officers of the Forest Rights Committees, who volunteered to implement the law, felt IFR yielded little change. In village 4, the committee secretary opined, “There is no change – only that some people received a title certificate. We’ve found no other difference... No facilities have been given on that [IFR] land yet... no water, no borewells, no assistance in building houses, nor any other help...” (Village 4). Another committee’s president lamented that his own application was rejected, but when we asked about the benefits of IFR, he said:

“These rights have no use! Look... even if we did not get rights to farm the forestland under the FRA, it would be the same situation. As for real development, for growth, for solutions?! Neither the government, the NGOs, nor the office in charge of the Forest Rights Act is giving us any information about meaningful development schemes!” (FRC president, Village 5)

Like the studies reviewed in van der Molen’s (2016) critique of de Soto (2000), my data call into question the economic benefits of formalization of agricultural land rights. These results differ from earlier studies in Ethiopia, Asia and Latin America where formalization caused, or was at least correlated with, improved household economic indicators (Holden and Ghebru 2013; Lawry et al. 2014). One difference between those tenure reforms and the Forest Rights Act is that the IFR are not alienable by sale, and thus, my respondents could not neither mortgage their land nor sell it.

My quantitative and qualitative results resemble the studies on formalization in sub-Saharan Africa (Nyamu-Musembi 2007; Perz et al. 2014). According to Lawry et al. (2014), “gains to formalization in Africa may be more limited because tenure insecurity, which formalization seeks to remedy, is often not present to the degree that the designers of reform programs assume.” This explanation may also apply to my respondents in Santrampur.

Unlike most forest communities (Das 2013, Bandi 2015a), these villagers farmed relatively freely before the Forest Rights Act came into force.

4.2 Pre-existing Tenure Security

As described above, the Indian Forest Department was a major source of tenure insecurity for *adivasis* before the Forest Rights Act of 2006 (Pimple and Sethi 2005; Sarin 2014). However, the Forest Department stopped asserting its rights over forestland in Santrampur block, Gujarat, at least a decade before my fieldwork began. According to a household in village 3, the Forest Department stopped fining farmers in 1992, a claim corroborated by our examination of fine receipts. Numerous interviewees had been extorted, beaten, or otherwise intimidated by the Department – but only 10, 15 or even 20 years ago. The secretary of Village 5’s FRC explained, “Before, we were frightened of men in khaki trousers --in other words, of the police. So we didn’t do much farming on the forest. Everyone was scared of them. We had so little awareness. We were so scared that we’d run and hide at the sight of anyone in trousers!” His female relative interjected. “But for the past 10 or 12 years, we’ve been aware – we’ve been awoken!” His counterpart in Village 3 reported that the Forest Department had not interfered with forest farming since 2005 or 2006. The villagers in Village 4 had convinced the Department to allow them to farm the forest in the 1980s, on the heels of displacement by a dam and a botched compensation plan.

The FRC interviewees described the local Forest Department’s involvement in the IFR process as ranging from "helpful" to "disengaged" unlike the obstructionism in other parts of the country (Sarin 2014). Ms. Kanjani and I only saw one Forest Department official in over two months of living in the field. As a resident of Village 3 said, “No Forest Department official is seen here! They do not even come to do patrols of the forest” i.e. the most basic duty of the Department. Finally, the Forest Department in this Santrampur had apparently never resorted to extreme measures; evictions and crop destruction were unheard of even according to respondents who had a dim impression of the Forest Department. The absence of enforcers and enforcement of forest law is atypical (Pimple and Sethi 2005; Das 2013).

Some respondents mentioned that a forester had recently prevented them from clearing additional land, but such new farmland would not have been eligible for IFR anyway. 88% of all households reported currently farming on land to which they did not have rights. They were open in admitting this illegal activity to me, Ms. Kanjani, and the enumerators. The IFR transfers ownership from the state to local people, but in Santrampur, the state seemed to have ceded *de facto* control long before. As scholars observed in certain parts of Africa, higher levels of tenure security than those typical of an *adivasi* community may explain why the evidence of the effects of the Forest Rights Act was so sparse here. Complete analysis of my transcripts could help evaluate me this idea more fully.

4.3 Size and Productivity of IFR Land

Another explanation for the divergence from some earlier studies is that so little land was actually covered by the IFR. When we asked whether Village 2 had received IFR had experienced any improvement in their wellbeing, its FRC president responded:

“Improvements in their lives? What improvements? Sister, how much land has the government approved [under IFR]? 10 *guntha*? 12 *guntha*? 40 *guntha*? That’s only one acre of land. Some people have received more than one acre – two acres, three acres, four acres -- but that’s all. No one in the village has been approved for more than four acres. [IFR] hasn’t been enough to prevent these families from needing to migrate to sustain themselves. There has not been a major improvement.”

These comments find confirmation in the quantitative data: The median amount of IFR land approved was less than $\frac{3}{4}$ of an acre (Table 3). 10% of approved households received less than 10% of their request, 50% received less than one-quarter of their request, and 75% received less than half of their request. The amount of land to which people are given rights could be too small to make a detectable difference in their farm income or food security, particularly if the land is not highly fertile (*piyat layak*). The sample consisted of 94 households with IFR, but those rights cover only a modest amount of land. A widespread complaint, corroborated by Bandi (2015a), was that the Forest Department was arbitrarily limiting the size of IFR parcels.

Furthermore, some of forestland in these villages is of limited productive value. Households with IFR repeatedly described their forestland as “*binpiyat layak*” (not very fertile), “stony,” “steep,” and “not good for much.” In certain villages, the forestland was so hilly that “*dungar*” (“hill”) was synonymous with “government forestland.” In the absence of level land and irrigation, such forestland was only suitable for corn, which yielded our respondents extremely low price in the market. Interviewees from Village 4 repeatedly referenced the poor quality of their private land in answering questions about their wellbeing, emphasizing how difficult it was to plant. At this stage, is it unsurprising that changing the rights regime over a sliver of forestland would lead to changes in food security, let alone farm income.

Rather than forest rights, concerns about irrigation loomed large in our survey respondents’ comments on their life satisfaction, just as owning irrigated land had a strong correlation with on-farm income in my linear model ($p \sim 0.000$, Table 10).

“If we get an irrigation system, then it would be good; leveling the land is good... these things would improve our lives.” (Village 4)

“We need an irrigation facility for development.” (Village 2)

“None of the land in this village is *piyat layak*. If our family had *piyat layak* land, then we would not have to migrate and do day labor.” (Village 3)

4.4 Government Benefits

Households that had secured Individual Forest Rights were significantly more likely to have received a subsidized borewell or a house renovation subsidy in the year prior to data collection. Regardless of its social and political capital,³¹ a household with IFR was approximately 8.9% more likely to have a subsidized borewell and approximately 16.5% more likely to have a housing subsidy. Since applications for these benefits require the applicant to prove ownership of the farmland or the house in question, it is possible that having an IFR title helped a household receive these subsidies. A handful of survey and interview respondents mentioned that IFR had or would ease their access to these benefits, similar to the expectations of other Bhil IFR applicants in nearby Rajasthan (Bose 2013).

Access to government subsidies could be a significant – and thus far, unrecognized – benefit of IFR. Further research studies should distinguish between borewells and houses on former forestland (now under IFR) and wells and houses on private land, whose titles were not affected by the FRA. The households I surveyed may have been more likely to get both IFR and government benefits due to unobserved confounders, such as having complete documents, personality traits such as persistence, or unmeasured political clout.

4.5 Future Research: Intangible Benefits

Given their ambivalence about its benefits, why did these Bhil families even apply for IFR? Applying for IFR requires considerable effort and cost: traveling to government offices, paying for copies of documents, gathering elders to testify to past land use, sketching maps, finding a literate helper, and, according to some interviewees, bribing the authorities. Perhaps the answer lies in intangible benefits, such as mental security, or the right to exclude others.

A few respondents appreciated that IFR includes the ability to exclude others: “We applied so that we can get the land nearby. If we don't get the rights, then someone else can come and cultivate on that land!” People mentioned their neighbors seizing titled private land and untitled forestland alike. One family we surveyed had allegedly murdered a member of another surveyed household in a land dispute, long before the FRA. Individual Forest Rights were not necessarily a solution: as Bose (2011) found in other Bhil villages, it sometimes amplified conflict. The Forest Department paused its work on IFR applications in one village, due to intense disputes between applicants. In another village, two brothers were arrested after a violent fight when a forester came to measure one brother’s IFR plot. Based on this limited information, conflicts over land rights both predated and followed the FRA. However, until I can fully analyze my interview transcripts or, even better, conduct additional interviews, the potential intangible value of IFR to these Bhil households remains inconclusive.

³¹ measured by participation in groups and government committees

4.6 Limitations

Unlike other *adivasi* communities, these five villages are well connected to civil society; they have worked with a local NGO on reforestation and livelihoods for the past 20 years. The NGO played no direct role in IFR but thanks to their past work, the villagers may be better positioned to reap any IFR benefits than more isolated villages. Another limitation of is the lack of a random sample; the data thus underrepresent the larger villages. In addition, households may have responded differently to our enumerators than to my research assistant and me, who were familiar faces.³² Finally the validity of the life satisfaction question was limited by its position in the survey; it was strongly influenced by the preceding questions about assets (Table 11, OECD 2013).

³²My survey was inadvertently identical to the government survey that determines if a household is above/below poverty line and thus eligible for benefits; underreporting on the government survey is rampant. I used Wilcoxon rank sums to check for biased economic results based on enumerator. There was no significant difference in the farm income data ($p=0.0952$), total income ($p=0.144$) nor land holding. However, IFR households surveyed by the enumerators reported significantly lower pre-IFR asset counts, so I excluded this data from my analysis ($p\sim 0.000$)

5. CONCLUSION

Gaining formal rights to forestland they were already using has yielded few measurable changes in economic or subjective wellbeing for indigenous *adivasis* in Santrampur, Gujarat. The Forest Rights Act has not, thus far, “ensur[ed] livelihood and food security” as promised in its preamble, whether due to pre-existing tenure security, or to the minute size of IFR parcels in these villages (Government of India 2006). However, interviews and conversations indicate that people’s enthusiasm for the law remains strong. Individual Forest Rights are a necessary but insufficient safeguard for the livelihoods of indigenous people in Santrampur. Ensuring the accurate measurement of IFR lands would be a major step toward unlocking the potential of the Forest Rights Act in these communities.

6. LITERATURE CITED

- Alkire, S., and Santos, M. E. (2014). Measuring Acute Poverty in the Developing World: Robustness and Scope of the Multidimensional Poverty Index. *World Development*, 59, 251–274. <http://doi.org/10.1016/j.worlddev.2014.01.026>
- Bandi, M. (2015). Forest Rights Act in Chhattisgarh and Gujarat: Unfolding the Dynamics in Implementation. *Journal of Rural Development*, 34(2), 134–147.
- Bandi, M. (2015). Forest Rights Act: Land Distribution and Livelihoods of Forest Dependent People. *Economic and Political Weekly*, 50(4), 59–66.
- Bose, P. (2011). Forest Tenure Reform: Exclusion of Tribal Women’s rights in Semi-arid Rajasthan, India. *International Forestry Review*, 13(2), 220–232. <http://doi.org/10.1505/146554811797406615>
- Bose, P. (2013). Individual Tenure Rights, Citizenship, and Conflicts: Outcomes from Tribal India’s Forest Governance. *Forest Policy and Economics*, 33, 71–79. <http://doi.org/10.1016/j.forpol.2012.09.016>
- CFRLA. (2016). Promise and Performance: Ten Years of the Forest Rights Act in India, December 6–7.
- Das, S. (2013). India’s Rights Revolution: Has It Worked for the Poor? In *India’s Rights Revolution*. Delhi: Oxford University Press.
- de Soto, H. (2000). *The Mystery of Capital*. New York, NY: Basic Books.
- Deininger, K., and Hilhorst, T. (2013). Using the Land Governance Assessment Framework to Help Secure Rural Land Rights: Framework and Experience Thus Far. In S. T. Holden, K. Otsuka, and K. Deininger (Eds.), *Land Tenure Reform in Asia and Africa: Assessing Impacts on Poverty and Natural Resource Management* (pp. 354–379). New York, NY: Palgrave Macmillan.
- Deininger, K., Jin, S., and Nagarajan, H. K. (2007). *Land Reforms, Poverty Reduction, and Economic Growth: Evidence from India. Policy Research Working Paper* (Vol. 4448).
- Demsetz, H. (1967). Toward a Theory of Property Rights. *American Economic Review*, 57(2), 347–359.
- Director of Census Operations, Gujarat. (2011). Village-and Town-wise Primary Census Abstract. In *Panchmahal District Census Handbook*. http://www.censusindia.gov.in/2011census/dchb/2417_PART_B_DCHB_PANCH%20MAHALS.pdf

- Galiani, S., and Schargrodsy, E. (2010). Property Rights for the Poor: Effects of Land Titling. *Journal of Public Economics*, 94(9–10), 700–729. <http://doi.org/10.1016/j.jpubeco.2010.06.002>
- Gertler, P. J., Martínez, S., Premand, P., Rawlings, L. B., and Vermeersch, C. M. J. (2011). *Impact Evaluation in Practice*.
- Gilbert, A. (2002). On the Mystery of Capital and the Myths of Hernando de Soto: What Difference does Legal Title Make? *International Development Planning Review*, 24(1), 1–19. <http://doi.org/10.3828/idpr.24.1.1>
- Government of India. (2006). Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Bill of 2006. New Delhi, India: Lok Sabha.
- Hatcher, J., and Luke, B. (2010). *Tropical Forest Tenure Assessment Trend: Challenges and Opportunities*. Washington, DC: Rights and Resources Initiative.
- Holden, S. T., and Ghebru, H. (2013). Welfare Impacts of Land Certification in Tigray, Ethiopia. In S. T. Holden, K. Otsuka, and K. Deininger (Eds.), *Land Tenure Reform in Asia and Africa: Assessing Impacts on Poverty and Natural Resource Management* (pp. 137–161). New York, New York: Palgrave Macmillan.
- Holden, S. T., Otsuka, K., and Deininger, K. (2013). Land Tenure Reforms, Poverty, and Natural Resource Management: A Conceptual Framework. In S. T. Holden, K. Otsuka, and K. Deininger (Eds.), *Land Tenure Reform in Asia and Africa: Assessing Impacts on Poverty and Natural Resource Management* (pp. 1–26). New York, New York: Palgrave Macmillan.
- IFRI. (2013). International Forestry Resources and Institutions (IFRI) Network: Research Methods. www.ifriresearch.net.
- Khandker, S., Koolwal, G., and Samad, H. (2009). *Handbook on Impact Evaluation*. Washington, DC: The World Bank. <http://doi.org/10.1596/978-0-8213-8028-4>
- Kumar, K., Singh, N. M., and Kerr, J. M. (2015). Decentralisation and Democratic Forest Reforms in India: Moving to a Rights-Based approach. *Forest Policy and Economics*, 51, 1–8. <http://doi.org/10.1016/j.forpol.2014.09.018>
- Kunz, Y., Hein, J., Mardiana, R., and Faust, H. (2016). Mimicry of the Legal: Translating de Jure Land Formalization Processes Into de Facto Local Action in Jambi Province, Sumatra. *ASEAS- Austrian Journal of South-East Asian Studies*, 9(1), 127–146. <http://doi.org/10.14764/10.ASEAS-2016.1-8>

- Larson, A. M., Brockhaus, M., Sunderlin, W. D., Duchelle, A., Babon, A., Dokken, T., ... Huynh, T.-B. (2013). Land Tenure and REDD+: The Good, The bad and The ugly. *Global Environmental Change*, 23(3), 678–689. <http://doi.org/10.1016/j.gloenvcha.2013.02.014>
- Larson, A., Barry, D., and Dahal, G. R. (2010). New Rights for Forest-based Communities? Understanding Processes of Forest Tenure Reform. *International Forestry Review*, 12, 78–96.
- Lawry, S., Samii, C., Hall, R., Leopold, A., Hornby, D., and Mtero, F. (2014). The Impact of Land Property Rights Interventions on Investment and Agricultural Productivity in Developing Countries: a Systematic Review. *Campbell Systematic Reviews*, 2014(1).
- Menzies, N. (2007). *Our Forest, Your Ecosystem, Their Trees*. New York, NY: Columbia University Press.
- Narh, P., Lambini, C., Sabbi, M., Pham, V., and Nguyen, T. (2016). Land Sector Reforms in Ghana, Kenya and Vietnam: A Comparative Analysis of Their Effectiveness. *Land*, 5(2), 8. <http://doi.org/10.3390/land5020008>
- Naughton-Treves, L., and Wendland, K. (2014). Land Tenure and Tropical Forest Carbon Management. *World Development*, 55, 1–6. <http://doi.org/10.1016/j.worlddev.2013.01.010>
- Nyamu-Musembi, C. (2007). De Soto and Land Relations in Rural Africa: Breathing Life into Dead Theories about Property Rights. *Third World Quarterly*, 28(8), 1457–1478. <http://doi.org/10.1080/01436590701637334>
- OECD. (2011). *How's Life? Measuring Well-Being*. <http://www.oecd.org/statistics/how-s-life-23089679.htm>
- OECD. (2013). *OECD Guidelines on Measuring Subjective Well-being*. <http://doi.org/10.1787/9789264191655-en>
- Ossome, L. (2014). Can the Law Secure Women's Rights to Land in Africa? Revisiting Tensions Between Culture and Land Commercialization. *Feminist Economics*, 20(1), 155–177. <http://doi.org/10.1080/13545701.2013.876506>
- Perz, S., Barnes, G., Shenkin, A., Rojas, D., and Vaca, C. (2014). Private and Communal Lands? The ramifications of Ambiguous Resource Tenure and Regional Integration in Northern Bolivia. *International Journal of the Commons*, 8(1), 179–206. <https://www.thecommonsjournal.org/index.php/ijc/article/view/URN:NBN:NL:UI:10-1-116086/372>

- Pimple, M., and Sethi, M. (2005). Occupation of Land in India: Experiences and Challenges. In S. Moyo and P. Yeros (Eds.), *Reclaiming the Land: The Resurgence of Rural Movements in Africa, Asia, and Latin America* (pp. 233–256). New York, New York: Zed Books.
- Prabhu, P. (2001). In the Eye of the Storm: Tribal peoples of India. In J. A. Grim (Ed.), *Indigenous Traditions and Ecology*. Cambridge, Massachusetts: Harvard University Press.
- Rights and Resources Initiative. (2017). *From Risk and Conflict to Peace and Prosperity: The Urgency of Securing Community Land Rights in a Turbulent World*. Washington, DC: Rights and Resources Initiative.
- Sarin, M. (2014). Undoing Historical Injustice: Reclaiming Citizenship Rights and Democratic Forest Governance through the Forest Rights Act. In S. Lele and A. Menon (Eds.), *Democratizing Forest Governance in India* (pp. 100–144). Delhi: Oxford University Press.
- Schlager, E., and Ostrom, E. (1992). Property-Rights Regimes and Natural Resources: A Conceptual Analysis. *Land Economics*, 68(3), 249–262.
- Shukla, R. (2010). *How India Earns, Spends and Saves*. New Delhi, India: SAGE Publications.
- Sjaastad, E., and Cousins, B. (2008). Formalization of Land Rights in the South: An Overview. *Land Use Policy*, 26.
- van der Molen, P. (2012). After 10 Years of Criticism: What is Left of de Soto's Ideas? *Cadastral and Land Administration Perspectives*, (August), 1–15.
- White, S. C., Gaines, S. O., and Jha, S. (2013). Inner Wellbeing: Concept and Validation of a New Approach to Subjective Perceptions of Wellbeing-India. *Social Indicators Research*, 119, 723–746. <http://doi.org/10.1007/s11205-013-0504-7>
- World Bank. (2006). India: Unlocking Opportunities for Forest-Dependent People in India, Volume 1, Main Report <https://openknowledge.worldbank.org/handle/10986/8416>
- Xaxa, V., Ramanathan, U., Bara, J., Misra, K. K., Bang, A., Basant, S., and Panda, H. (2014). *Report of the High Level Committee on Socio-Economic, Health, and Educational Status of Tribal Communities of India*. New Delhi, India.

7. APPENDIX

Probit model of a household’s likelihood of receiving a subsidized borewell

I developed a probit model with the same variables as the logistic model (Table 6). This model provides qualitative support for my initial findings, as there was a positive and significant relationship between having IFR and a subsidized borewell in both models ($p=0.32$, Table A). The coefficients have same signs as both model’s coefficients (Table A, 6).

Table A: Probit model of a household’s likelihood of receiving a subsidized borewell (n=196)

Explanatory variable	Coefficient	P value
IFR status	0.5699714	0.032*
# of groups	0.3219937	0.112
Member in JFM Committee	-0.3350225	0.477
Member in Forest Rights Committee	0.2957067	0.509
Household’s education attainment (years)	-0.0329201	0.219
Fertile ³³ private land (<i>guntha</i>)	-0.0122474	0.156
Constant	-1.369023	0.000**
Goodness of fit measures		
Pseudo R-squared	0.0759	-
Percent predicted correctly	89.80%	-

*=significant at .05 level. **=significant at .01 level ***=significant at .001 level

Probit model of a household’s likelihood of receiving a housing subsidy

I developed a probit model for the probability of receiving a housing subsidy, using the same explanatory variables as the logistic model in the Results section. This model provides qualitative support for the findings of the logistic model, as it also demonstrates a positive and significant relationship between receiving the housing subsidy and having IFR ($p=0.008$) and a negative relationship between the subsidy and the household head’s educational attainment ($p=0.007$, Table B). The coefficients of the probit model have the same signs as the coefficients as the logit model (Table B, 8).

³³ *Piyat layak*: Arable land with access to water and a gentle slope; i.e. fairly productive.

Table B: Probit model of a household's likelihood of receiving a house renovation subsidy (n=196)

Explanatory variable	Coefficient	P value
IFR status	0.5384811	0.008*
# of groups	-0.0678493	0.744
Member in JFM Committee	0.504703	0.140
Member in Forest Rights Committee	-0.1966035	0.637
Household head's educational attainment (years)	-0.0558992	0.007**
Fertile private land (acres)	0.0000906	0.981
Constant	-.7024472	0.000***
Goodness of fit measures		
Pseudo R-squared	0.0808	-
Percent predicted correctly	73.47%	-

*=significant at .05 level. **=significant at .01 level ***=significant at .001 level