

Mutual Dependence and Expectations of Cooperation

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Abstract Why are some communities better than others at generating cooperative behavior? We argue that mutual dependence on collective social institutions (CSI) increases expectations of cooperation, a key building block for collective action. We examine the effects of mutual dependence by studying property rights institutions in rural Malawi and Zambia. We find that respondents expect their neighbors with customary property rights to be more cooperative than those with land titles – a situation of lower shared dependence on the CSI. A conjoint survey experiment with more than 7,000 respondents allows us to separate the impact of mutual dependence within the CSI from other salient characteristics, including migration status, wealth and ethnicity. Additionally, we explore three forms of institutional obligations that help explain why reduced mutual dependence dampens expectations of cooperation. These findings provide a richer theoretical understanding of the pre-conditions for cooperative behavior and the interdependence that sustains collective action.

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Collective action is fundamental to promoting development and providing public goods in communities, particularly in fiscally weak states (Ostrom 1990; Habyarimana et al. 2009; Magaloni, Díaz-Cayeros and Ruiz Euler 2019; Baldwin 2016). However, some communities are better at achieving it than others. Central to successful collective action is overcoming the free-rider problem; community members have lower incentive to collaborate if they anticipate that others in their community will benefit without contributing. Studies of “conditional cooperation,” have repeatedly demonstrated that beliefs about others’ contributions shape how individuals cooperate, independent of sanctioning mechanisms (Ostrom 2000; Fischbacher, Gächter and Fehr 2001; Rustagi, Engel and Kosfeld 2010; Thöni and Volk 2018). The *expectation* of cooperation is therefore key to achieving collective action (Axelrod 1984; Yamagishi 1986). What then determines whether or not individuals will expect their neighbors to cooperate? We argue that dependence on collective social institutions (CSIs) bolsters residents’ expectations that others in the community will cooperate, thereby making collective action easier to achieve.

A rich body of scholarship has identified socially-embedded and self-enforcing institutions, which we term collective social institutions, as a solution to collective action problems related to human and economic development. Scholars have demonstrated that age-grade societies in Nigeria, ethnic institutions in Kenya, and lineage groups in China effectively mobilize contributions to build roads, schools, and other local public goods (Miguel and Gugerty 2005; Akinola 2008; Xu and Yao 2015; Lust and Rakner 2018). Solidary groups, such as the temple organizations described by Tsai (2007), can create powerful informal institutions of accountability that make cooperation towards shared goals possible. Further, CSIs enforce compliance to shared expectations, allowing for a range of developmental advantages, from the foundations of contract enforcement and trade in Medieval Europe (Greif 2006) to sustainable irrigation systems in the Philippines (Ostrom 1990). Such cooperation within collective social institutions also undergirds ethnic favoritism (Habyarimana et al. 2009) and may be co-opted to support non-developmental patterns of collective behavior, such as vote buying or brokerage (Finan and Schechter 2012). There is overwhelming evidence that CSIs promote collaboration within communities, yet less is understood about the interdependence that sustains cooperation within

CSIs.

CSIs can facilitate collectively beneficial outcomes and help communities mitigate risk. However, community members who are less dependent on the CSI for collective benefits, such as credit, social services, or resource access, have greater freedom to defy shared obligations. From the perspective of other members of the institution, such individuals have lower “mutual dependence.” In this context, mutual dependence reflects the degree to which two individuals are dependent on the same institution. Awareness that some members are less dependent on the CSI may shape others’ beliefs about their likelihood of cooperation. Thus mutual dependence can strengthen expectations of cooperative behavior among those within the CSI.

We examine the impact of mutual dependence on expectations of cooperation through a study of plural property rights institutions in two Southern African countries, Malawi and Zambia. In this study then, customary institutions are the CSI of interest. While most rural citizens in these two countries access land through customary property rights governed by CSIs and enforced by networks of customary authorities ([Matchaya et al. 2009](#)), statutory land titles introduce an institutional alternative to customary land tenure. Individuals with land titles have greater independence from the CSI than those with customary land rights. They may still choose to comply with social obligations for a number of other benefits, but their access to a critical resource for their livelihoods is not exclusively dependent on the institution. This variation in mutual dependence on the CSI should impact expectations of cooperation: Those who depend on the CSI for land access should have lower expectations of cooperation from those who do not. These expectations are a core building block for collective action.

Understanding the effects of different forms of property rights is fraught with endogeneity issues: it is challenging to differentiate among household characteristics that historically influenced who possesses a title from the effects of the title itself. Individuals with land titles may be systematically different than those without. Ethnicity, gender, nativity, political connections, education, land value, and wealth, among others, may impact the likelihood a household has a land title ([Alston and Mueller 1999](#); [Platteau 2000](#); [Hassan and Klaus 2020](#); [Honig 2022](#)). However, overcoming this challenge is also crit-

ically important, both because it helps us understand the mechanisms linking CSIs to cooperation and because of its implications for the land titling policies present in nearly every African country, as discussed shortly. We employ a novel approach to this inferential issue by using a (pre-registered, see Appendix F) conjoint survey experiment. This helps us to separate the impact of possessing a land title from other potentially salient characteristics of a hypothetical neighbor. Further, we also use demographic data to identify correlates of land titling in our sample. The profile of those with title that emerges suggests that our experimental design controls for the key characteristics associated with title that might confound the relationship between lower dependence on the CSI (having a title) and expectations of cooperation. In this context, title is a strong informational cue that signals reduced mutual dependence, which allows us to shed light on the foundations of collective action in CSIs by understanding expectations around who is likely to cooperate.

Our results illustrate that mutual dependence consistently increases expectations of cooperation. To examine the impacts of shared reliance on the CSI, we focus on the perspectives of respondents with customary property rights. We find that they evaluate those with greater mutual dependence to be more likely to cooperate than those with lesser mutual dependence, signalled by a land title. The information that a hypothetical neighbor is also exclusively reliant on the CSI for land access is sufficient to generate an expectation that they will be more cooperative than one who is outside of this dyadic situation of mutual dependence. This finding is not limited to one country or CSI; mutual dependence operates similarly in the two countries. Further, we propose three forms of institutional obligations that help explain why reduced mutual dependence on the CSI may dampen expectations of cooperation. We find evidence that mutual dependence impacts anticipated cooperation by way of its effects on compliance with vertical obligations to customary authorities, horizontal obligations to risk-sharing norms, and diffuse obligations to a local way of life.

Expectations that others will cooperate are central to actual collaboration ([Fischbacher, Gächter and Fehr 2001](#); [Rustagi, Engel and Kosfeld 2010](#); [Martinsson, Pham-Khanh and Villegas-Palacio 2013](#); [Thöni and Volk 2018](#)). Even if community members share a collec-

tive goal, they “will actually cooperate only when they are convinced that partners will reciprocate their initiative and will not exploit their goodwill. Unless members have this trust, the risk is too strong that their cooperation may be exploited by the partners” (Yamagishi 1986, p.111). As a result, this research helps explain why CSIs have been shown to improve public goods provision and other forms of collective action in diverse contexts. Our study is the first to provide evidence that CSIs facilitate community cooperation *because mutual dependence increases expectations of cooperation* and therefore helps communities overcome free-rider problems. Our results shed light on the pre-conditions necessary for community cooperation; we reserve investigations of how this translates into actual community cooperative outcomes at different equilibria of mutual dependence for future research.

These findings also have implications for scholarship on the politics of property rights. Secure property rights have been deemed critical to long-term processes of economic development (North and Thomas 1973; Acemoglu, Johnson and Robinson 2001), leading policymakers to promote land titling in developing countries (Deininger and Binswanger 1999). Correspondingly, titling and registration are the most common types of land reform in Africa today (Sikor and Müller 2009, 1308). Much of the current research has examined the individual-level impacts of land titling, demonstrating that it increases tenure security and investment in some contexts, but not others (Lawry et al. 2017; Higgins et al. 2018). However, customary property rights reflect social and political relationships within the community (Okoth-Ogendo 1989; Goldstein and Udry 2008). Further, the differences between customary and state property rights also impact citizen-state relations and political conflict (Lund 2011; Boone 2014). Our study builds on these insights by shifting the focus from individual economic outcomes to unanticipated consequences of individual or “piecemeal” processes of land titling on cooperation *within communities*. Examining land titling as a window into expectations of cooperation sheds light on the trade-offs inherent in interventions that impact dependence on CSIs. Weakened ties of mutual dependence may dampen local mechanisms of collective action, with implications for a range of different short and long term outcomes for citizens, from greater autonomy from electoral brokerage by chiefs to reduced reciprocity among neighbors. These findings show that

titling shapes the ways in which community members interact, and therefore the effects of titling cannot be understood in isolation from their community level impacts.

The next section presents our general theory of mutual dependence as a foundation for expectations of cooperation. We then introduce the CSIs that govern property rights in Malawi and Zambia, before outlining how the mutual dependence theory generates expectations for these cases. A discussion of the survey and experimental approach used in this study follows. We then present our main analysis, suggestive evidence regarding mechanisms, and the implications of these findings for future research and policy.

Mutual Dependence and Collective Obligations

Scholars have demonstrated, over and over again, that, throughout the world, collective social institutions facilitate cooperation and accountability among members. We define CSIs as enduring sets of rules, norms, and processes that coordinate behavior within groups. These institutions are “collective” because their rules are enforced internally by members, much like the self-governing institutions described by Ostrom to effectively regulate common pool resources ([Ostrom 1990](#)). They are also embedded within a specific social context; like Greif and Tabellini’s social organizations, they are “held together by mutual moral obligations and group-specific morality, not just by economic interests or other common attributes” ([Greif and Tabellini 2017](#), 2). While CSI is an umbrella term that includes a wide variety of institutions (e.g., age-grade societies in Nigeria, lineage groups in China, etc.), this article examines one key set of CSIs known as customary or traditional institutions. These CSIs may combine formal and informal elements to coordinate collective behavior, while deriving legitimacy from custom and shared ancestry. Such institutions are a feature of many countries globally and are common within Sub-Saharan Africa ([Baldwin and Holzinger 2019](#)). The theory of mutual dependence that follows applies, but is not limited, to informal and customary institutions.

Collective social institutions are a resource used by communities to overcome development challenges. Communities cooperate by self-organizing to produce local public goods such as community schools and health facilities. They also cooperate through compliance with rules that generate collectively beneficial outcomes, including norms

facilitating mutual aid, social insurance, and risk-sharing (Platteau 1997; MacLean 2011; Kpessa-Whyte 2018) or the sustainable use of land and forests (Ostrom 1990). Yet individuals can benefit from these community-based forms of collective action without contributing to them. Understanding why individuals opt to cooperate, given the opportunity to defect, is thus the central puzzle for sustained provision of local public goods and social insurance. While the theory presented here has implications for collective action and public goods provision more generally, we focus on the role of CSIs in facilitating the first step toward successful collective action: individual expectations that others will cooperate.

Communities overcome collective action problems when individuals expect that other members will also cooperate. Trust, defined as “expectations individuals have about others’ behavior” is the core of behavioral models of individual cooperation (Ostrom 1998, 14). Well-established determinants of cooperation, such as repeated interactions, exert their impacts on individual decisions because actors learn what to expect from other players (Axelrod 1984). Conditional cooperation dynamics may be particularly important for sustaining collective action within communities, as Fischbacher and Gächter (2010, 542) have demonstrated, learning that others are free-riding leads to decreased contributions and “the decline of cooperation.” Similarly, Ostrom (2000) argues that the practice of conditional cooperation generates high levels of cooperation with lower investments in enforcement.¹ Expectations are also central to approaches to collective action that emphasize shared norms of reciprocity. Trust that others will cooperate is the foundation for systems of social insurance within communities (Scott 1977; Fafchamps 1992; Habtom and Ruys 2007). Such expectations are, consequently, at the root of many different forms of collective action. In order to advance our understanding of when and why people cooperate, we examine the factors that shape an individual’s evaluation of the likelihood others will cooperate.

While scholars have identified ethnic ties, networks, repeated interactions, longer

¹See also Thöni and Volk (2018) for a review of conditional cooperation studies and Martinsson, Pham-Khanh and Villegas-Palacio (2013) on conditional cooperation in countries with strong norms of collectivism. In addition, Rustagi, Engel and Kosfeld (2010) show how conditional cooperation improves communal forest management in Ethiopia.

time-horizons, and membership in close-knit groups as factors that increase the likelihood of cooperation, the role of mutual dependence has received far less scholarly attention (Axelrod 1984; Habyarimana et al. 2009; Dionne 2015; Atwell and Nathan 2021). CSIs provide collectively beneficial goods— including secure property rights, local public goods, and mutual aid. Dependence on these benefits creates incentives for individuals to comply with the institution’s norms of appropriate behavior. The knowledge that others have such incentives and that these needs are shared should increase expectations of cooperative behavior. In short, mutual dependence on CSIs reduces uncertainty regarding the likelihood of cooperation. This insight builds on theories of social exchange which examine structures of mutual dependence in which “actors are mutually, or reciprocally, dependent on one another for valued outcomes” (Molm, Collett and Schaefer 2007, 208). As Ekeh (1974) has argued, generalized dependence on other members of a network should create strong ties of trust and collectivist orientations. Further, scholarship on ethnicity has demonstrated that the ability to sanction is at the heart of collective action (Miguel and Gugerty 2005; Habyarimana et al. 2009). Individuals who are less dependent on the valued outcomes provided by a CSI should be less accountable to its sanctions. Those who *are* fully dependent on the CSI should anticipate lower cooperation from these ‘unsanctionable’ individuals.

If mutual dependence is a glue that helps community members anticipate cooperative behaviors from others, those who are dependent on the institution should have decreased expectations of cooperation of those who are less dependent. Three mechanisms – conceived of here as different types of obligations within a CSI – may connect mutual dependence to expectations of cooperation. Greater freedom from these different obligations may change how individuals are perceived by those who remain fully reliant on the CSI.

First, dependence on a CSI may impact expectations of cooperation because it reveals that the individual can be sanctioned by authorities within the institution. Individuals who are dependent on a CSI may be more obliged to comply with the institution’s system of authority, a vertical obligation. Vertical sanctions may be executed by authorities that are elected, chosen, or recognized by members of the institution. For example, village “detectives” in Japan’s CSIs punish defectors by imposing payments to the authority or

finer to the community (Ostrom 1990, 68). Such sanctioning systems increase cooperation by shaping individuals' expectations that others will cooperate, in addition to their more direct effect on enforcing actual cooperation (Yamagishi 1986). If mutual dependence signals to others that individuals are subject to internal sanctions by the same authorities, reduced dependence may decrease expectations of cooperation by revealing greater autonomy from shared vertical obligations in the CSI.

Alternatively, it may be obligations to participate in horizontal ties of reciprocity that link mutual dependence to expectations of cooperation. Individuals contribute to collective systems of risk-sharing in anticipation that, in the future, the favor will be returned (Fafchamps 1992; Platteau 1997). For example, within CSIs regulating fishing communities in Senegal, fishermen agree to contribute time, fuel, and funds to help members whose boats are damaged or lost at sea based on the assumption that the assistance will be reciprocated (Platteau 1997, 768-9). However, if the same fisherman joined a commercial fishing cooperative, or enrolled in formal insurance, would other community members expect him to continue to contribute to the mutual aid system? Being denied aid from community members in the future is a less effective sanction if the individual has lower dependence on the CSI. It may be that if an individual no longer needs to participate in risk-sharing and horizontal systems of social insurance, he is no longer expected to cooperate more generally. The knowledge that the individual does or does not have an outside option may connect variations in mutual dependence to expectations of cooperation. This mechanism does not require monitoring by a central authority; instead, CSI members with relatively equal power could enforce horizontal obligations.

Finally, mutual dependence may shape individuals' expectations through a more diffuse set of obligations to the institution. A sense of shared dependence on a CSI may contribute to expectations of cooperation by creating a psychological in-group. Social identity theorists have argued that individuals use group boundaries to make predictions about others' behaviors, independent of the social content of group identities (Tajfel 1970). Further, individuals treat their in-group more favorably than an out-group based on an expectation that cooperative behavior will be reciprocated by in-group members (Yamagishi and Kiyonari 2000). These approaches suggest that those who are dependent

on the same institution may feel that they share something symbolic that is separate from or indirectly related to their compliance with vertical or horizontal obligations. Put differently, they may have the feeling of being “in the same boat” or conforming to the same “way of life.” If mutual dependence fosters an in-group sentiment, those who are dependent on the institution may perceive those with lower dependence as an out-group. This suggests that mutual dependence may exert an effect as a symbolic social boundary, which serves as a heuristic about others’ behavior.

As these mechanisms suggest, dependence shared among members of institutions is best understood as degrees of mutual dependence, not as a binary status: members may be more or less reliant on different outcomes generated by the CSI and consequently be in situations of more or less mutual dependence with other members. They may be reliant on the CSI in some domains of their lives and not others. Put differently, there are spectrums of relations of mutual dependence within communities. Individuals’ perceptions of these degrees of mutual dependence with others should, in turn, structure their expectations of cooperation. Further, although it is useful to consider each of these three mechanisms as distinct processes which may be activated in different contexts, they are not mutually-exclusive and, therefore, may reinforce each other in some situations but not others. The next sections introduce the context of CSIs in Zambia and Malawi and then translates this general theory of mutual dependence to these specific cases.

Customary Institutions in Malawi and Zambia

Communities in both countries rely on customary institutions for public goods provision, norms of risk-sharing and reciprocity, and land tenure security, making them an important setting for examining the roots of cooperation within CSIs. The customary institutions that govern land rights in Zambia and Malawi trace their origins to precolonial polities and colonial indirect rule. The British colonizers relied on chiefs to govern throughout both countries ([Chanock 1985](#); [Chiweza 2007](#)). After independence, the governments of Zambia and Malawi maintained the status quo established by the British. Both governments recognize chiefs as custodians of untitled land within bounded jurisdictions and treat them as intermediaries with local populations.

The CSIs that govern customary land rights vary widely within Zambia and Malawi, yet there are broad similarities in their structures and roles of customary institutions. Chiefs are leaders within these customary institutions who enforce its rules and embody its authority, making them a special set of elite members of the institution. In this article, we refer to all of the authority roles within customary institutions as "chiefs." However, both countries feature hierarchies of institutional leadership (Chinsinga 2006; Baldwin 2016). In practice, the institutions' rules are enforced by a diffuse network of authorities including village heads, group village heads, lineage or clan heads, traditional councilors, official chiefs, sub-chiefs, senior chiefs, and paramount chiefs. Although many of Malawi and Zambia's customary institutions build upon ethnic ties and shared historical narratives, villages are often ethnically-heterogeneous. All residents on customary land in the community are subject to the institution's land governance, regardless of their ethnicity.

Customary property rights are land rights that derive from rules and processes within the CSIs examined here. They are, by definition, outside of direct government regulation and internal to a customary institution. They regulate a variety of different land usage and ownership rights and practices. For example, customary institutions establish the legitimate processes for newcomers or migrants to access land within the community through arrangements with chiefs or community members (e.g. Unruh, Cligget and Hay 2005). Similarly, land inheritance rules are enshrined in these CSIs. Chiefs have an important role in enforcing systems of customary property rights (Chinsinga 2006). They are recognized as land governance authorities by members of the institution; when there is a dispute within a family over inheritance rights or among neighbors over the boundaries of their land, they turn to chiefs. Chiefs in Zambia and Malawi also administer the institution's rules of secondary or collective land use. For example, they can determine timelines for secondary grazing rights or communicate regulations for shared access to water sources. Although chiefs have key powers of enforcement, security of customary rights also relies to some degree on other members of the institution; for example, a farmer's property rights may be threatened by neighbors expropriating land that has been left fallow or temporarily uncropped.

The customary institution's governance of land rights is closely tied to its roles in con-

flict resolution, public goods provision, and social identity formation. In Malawi and Zambia, customary institutions and the chiefs who lead them adjudicate conflicts within their communities (Jul-Larsen and Mvula 2009; Eggen 2011; Swidler 2013). This includes petty crimes, family disputes, and – importantly – conflicts over land. They facilitate the provision of local public goods by mobilizing contributions to community projects, such as drawing water or making bricks for new buildings (Chiweza 2007; Baldwin 2016) or participating in the requisite labor to clear shared pathways (Swidler 2013). Chiefs may use threats of eviction from the village and other punishments to enforce compliance with their judgements on cases and to mobilize community participation in public goods projects (Dulani 2003; Kita 2019). Finally, customary institutions may also serve as a connection to shared identities (Chinsinga 2006; Logan 2013), which may be stronger for those who are co-ethnic with the chief. Thus, customary institutions in Malawi and Zambia influence many areas of an individual’s daily life and these different functions reinforce each other.

The two countries also feature similar dual land tenure systems as a result of their British colonial legacies and the more recent expansion of land titling in African countries. In each country, the majority of land is officially customary land under the custodianship of networks of chiefs and the majority of smallholder farmers rely on customary property rights to access their land. Within our sample, which focuses on the hinterland of both countries, 93% of respondents in Zambia and 89% in Malawi rely on customary property rights. Yet the two governments have also facilitated the slow replacement of customary rights with statutory land titles. Zambia’s 1995 Lands Act and Malawi’s 2002 National Land Policy aimed to accelerate land titling.²

While the governments in both countries have streamlined the process for individuals to adopt titles on any plot of customary land, they have also established that chiefs must provide written consent for all new titles on customary land (Machina 2002; Eggen 2011). Individuals access titles by applying for the chief’s consent and then advancing the application through the government bureaucracy. Once the chief consents to titling, the plot

² Malawi’s policy was passed by the legislature but has not yet been implemented by the executive branch.

of customary land “converts” to either “state” (Zambia) or “private” (Malawi) land. This removes the land from the authority of chiefs and customary institutions. As a result, chiefs in both countries have opposed changes to land laws that make it easier to title land in recent years (Sangala 2016; Kapata 2018). Further, there is wide variation in their willingness to grant titles and their reasoning for doing so. Opportunities for material and political gains, personal evaluations of the applicants, and social proximity to them should all impact how chiefs use their discretion to supply or refuse title requests (Honig 2022).

Smallholder farmers in these countries expressed a generally positive view of land titling because they expect it to increase their tenure security. Within our samples, 77% reported that titling helps the community and, among those respondents who reported it helps, 73% said that it helps because it provides more secure property rights.³ By contrast, 18% of respondents indicated that titling hurts the community. Their reasons for this choice were that it: creates divisions within the community (46%), reduces compliance with customary authorities (31%), changes the traditional way of doing things (27%), and interferes with secondary property rights (22%). Although titling is increasing in the two countries, the majority of smallholder farmers rely on customary rights. In part, this is due to the relatively high security of customary tenure. Respondents in these samples with customary and state titles reported similar degrees of confidence their land rights: 84% with customary rights and 89% with titles said that they are not worried about their land being expropriated.

Citizens seek titles in this context because it can offer an additional forum for securing one’s property rights beyond the local customary institution, among other reasons. Secure customary land rights require social embeddedness within local communities. For example, Ribot and Peluso (2003), building on (Berry 1993), describe how farmers opt to invest in social networks, economic relationships in the community, and patronage ties as mechanisms for securing access to land. However, a state title is a written acknowledgment of a land claim that can be used to access credit in banks and has higher legitimacy

³Notably, respondents’ reasons for a positive *community* influence of titles are actually *individual* benefits, suggesting that the prompt to reflect on community benefits may have been misunderstood by respondents. In addition, this question was asked post-treatment and should be interpreted accordingly.

in the state institutions that adjudicate property rights claims. By providing greater access to state forums, titling reduces an individual's exclusive reliance on the CSI for access to land. As local residents, individuals with land titles may still be highly engaged with the CSI for other areas of community life; they may turn to chiefs for conflict resolution that is more accessible than the state's, for example. Yet, as an alternative to customary land tenure institutions, titles also impact mutual dependence among community members.

Expectations

Shared reliance on a customary institution for access to land is a form of mutual dependence among two individuals. Two community members with customary property rights are both dependent on the CSI for at least one valued outcome—access to land. They both rely exclusively on the institution's norms of appropriate land use and authority to secure their property rights. Although the rules of customary land tenure vary among specific societies ([Okoth-Ogendo 1989](#)), for individuals with customary rights, the CSI determines whether their land can be rented, sold to outsiders, inherited, etc. This includes rules that empower networks of chiefs with the ability to adjudicate conflicts and enforce property rights. Within the same community, individuals with customary property rights are mutually dependent on the CSI.

By contrast, land titles are an alternative property rights institution. A land title represents a recognition of the state as the relevant authority over land. It makes an individual's property rights legible to the state ([Scott 1998](#)). Titles are therefore a resource that citizens can use to claim land rights that are independent of customary or ancestral ties ([Klaus 2017](#)), even in situations where the state has limited capacity or will to effectively enforce the rights enshrined in the document. Whereas individuals with only customary property rights rely solely on the customary institution to secure access to land, those with titles have a second option: the state. They may continue to cooperate, but a title represents greater freedom from the obligations of the customary institution.

In this context, a land title is a signal of reduced dependence on the customary institution for land access and, therefore, lower mutual dependence with those who rely on customary property rights. This signal should shape customary property rights hold-

ers' expectations of them. Individuals rely on informational cues to form expectations about whether others will cooperate (Axelrod 1984, 146-7); property rights institutions can function as an informational signal that allows actors to coordinate behavior (Runge 1984). Therefore, our central hypothesis is: *Individuals with dependence on the CSI (those without titles) will see individuals with lower mutual dependence (those with title) as less cooperative.*⁴ The empirical analyses that follow thus focus on how individuals without title — those in a situation of greater dependence on the CSI for land rights — respond to community members with versus without title. This compares a dyad with greater mutual dependence to one with lesser mutual dependence in the domain of land rights, in order to test if mutual dependence increases expectations of cooperation. We then examine how different types of obligations within the institution contribute to the impact of titling on perceptions of cooperation in this context.

Mutual dependence may exert its effects on expectations of cooperation by signaling that others must comply with obligations to the same authorities within the CSI. In the CSIs examined here, abiding the chiefs' directives is a vertical obligation within the institution. Chiefs' roles in dispute resolution and organizing collective action are connected to land stewardship; residents comply with customary conflict resolution, in part, because chiefs can use their powers over land governance to provide more secure tenure or better land to compliant households. However, individuals with title should have greater freedom to defy these vertical obligations within the CSI because they do not rely solely on customary rights to access their land. Those fully dependent on the CSI (without titles) may perceive this difference in accountability to the institution's vertical sanctions and change their beliefs about the likelihood of cooperation by those whose land access is not contingent on compliance with the customary institution. As a result, we should see *that individuals without titles expect individuals with land titles to be less compliant with orders from the chief.*

Alternatively, individuals with customary property rights may be expected to be more cooperative than those with titles because customary rights signal a greater reliance on

⁴Our pre-registered hypothesis directly maps onto the more general version presented here: "Those with title to their land will be seen as less cooperative by those who rely solely on customary property rights."

the institution's systems of reciprocity. Title, by contrast, may serve as a cue that an individual has greater autonomy from obligations to others within the CSI. Expectations of cooperation could be shaped by the belief that a titleholder would be less responsive to the threat of denied access to the fruits of reciprocity norms in the future. Risk-sharing land tenure practices are a key horizontal obligation in CSIs in Malawi and Zambia. Customary systems of property rights accommodate complex sets of secondary and collective rights. This includes, for example, shared access to water sources, the right to collect wild forest products, and grazing rights (Mulolwa 2006, 3). These secondary rights can serve as insurance or a "hedge against environmental uncertainty" (Runge 1986, 625). Individuals with title may be expected to be less cooperative with horizontal systems of social insurance, such as risk-sharing tenure arrangements, because they have an outside option with regard to securing their land access. This may be the case regardless of whether individuals with title actually *do* opt out of these obligations.

Therefore, we hypothesize that *those without titles may perceive those with titles to be less cooperative due to their freedom from risk-sharing tenure obligations.*

The theory of mutual dependence suggests that dependence on the CSI for access to one's land rights may increase expectations of cooperation because it creates a psychological in-group among individuals reliant exclusively on customary property rights. Titling may introduce a new boundary that has symbolic meaning beyond obligations to comply with chiefs or dependence on risk-sharing systems. Put differently, even if a neighbor with a land title is expected to comply with such vertical and horizontal obligations, she could be seen as less cooperative because of her autonomy from a more diffuse obligation to a community "way of life."

A symbolic division created by differences in property rights could be largely devoid of content, as in the minimalist versions of social identity theory, or it could represent a reliance on customary land tenure as a component of social identity. For example, in many communities, land is a connection to community and ancestors, such that its value extends far beyond economic utility (Jul-Larsen and Mvula 2009). Customary property rights are often reinforced through narratives related to family histories and custom, even as the institutional arrangements adapt over generations. As a result, accessing land

through customary property rights can represent participating in a way of life that is deeply connected to society and identity. Titling, by contrast, may be understood as an exit from the symbolic practices and norms of the CSI, even among community members who have similar wealth and are members of the same ethnic group. Possessing a land title may signal a new boundary between the customary/indigenous/local and the statutory/imported/"modern." Mutual dependence on the CSI for access to land may impact expectations of cooperation through more diffuse effects on shared norms and "ways of life." We propose that, if possessing a title is viewed as a new symbolic division within the community, then *individuals without title should report that individuals with land titles are less likely to observe the community's way of life.*

Existing social cleavages should also impact expectations of cooperative behavior and respondents' assumptions about individuals with different types of property rights in their communities. The types of property rights that individuals hold reflect local and national politics, including choices by both individuals and authorities. Of critical importance are migrant status, ethnicity, gender, age, and wealth, which have been shown to impact the strength of individuals' customary property rights and the accessibility of titles (Machina 2002; Matchaya et al. 2009; Meinzen-Dick and Mwangi 2009). For example, we might expect that chiefs are more likely to consent to titles for members of the majority ethnicity in a village or those who have "insider" status within the institution. Yet individuals with stronger customary property rights such as customary elites (Goldstein and Udry 2008) or members of indigenous lineages (Matchaya et al. 2009) should have lower demand for state titles. Thus those who have more marginal status within the institution may be more likely to seek out titles.

Importantly, the social cleavages that impact the types of property rights held by individuals should also impact expectations of cooperation. Individuals who have denser social networks from living in the community for a long time may be seen as more cooperative than those who have recently migrated, *ceteris paribus*. Similarly, individuals should anticipate that co-ethnics will be more cooperative, due to their greater capacity to enforce social sanctions (Fearon and Laitin 1996). While these attributes may indicate weaker community ties or lower status within the CSI, all individuals residing in the

community with customary land rights depend on the CSI, regardless of their ethnicity. In addition, wealthier individuals may be expected to be more cooperative or more likely to have access to land titles, due to their ability to pay the material costs of titling. As a result, to isolate the effect of land titling as a signal of reduced mutual dependence relative to these other characteristics, we incorporate these variables into our experimental design and use observational data to identify the salience of each of these five characteristics for land titling.

Empirical Approach

To test our theory and expectations, we implemented a single profile conjoint experiment in a large-scale survey in Malawi and Zambia. The 2019 LGPI (Local Governance and Performance Index) survey was conducted from May to October 2019 (Lust et al. 2019). The experiment is a part of a larger project that focuses on local governance, which seeks to make comparisons across rural communities (roughly 400 localities) in the two countries.⁵ However, we expected similar effects in both country samples, given their similar colonial histories and strong land-centric CSIs. The team sampled communities within 100 km of the Malawi-Zambia border as well as the region within 100 km from the Tanzania border. We randomly selected 250 one square kilometer grids within the sample region in each country and then surveyed 30 people in each grid,⁶ which was expected to produce a sample of 5,000 respondents on each side of the border. The final sample sizes for the study are 6,798 in Malawi and 5,564 in Zambia for a total of 12,362 respondents. The sub-sample of interest here is the 7,242 who reported owning land without title and received the experiment. This population is dependent on the CSI for land access, allowing us to identify how they respond to the signal of differences in mutual dependence within the CSI.

We opted to study the effects of land titling on expectations of cooperation via a survey experiment because it generates exogenous variation in the profiles of those with title

⁵We do not expect other questions in the survey to prime respondents as there was sufficient distance between the local institutions, ethnic identity, and migration sections and the land section of the survey. Besides basic questions about land ownership, the experiment preceded the vast majority of land-related questions.

⁶In this paper, 'locality' refers to these sample units.

(see more below). Studying the effects of land titling requires attention to the fact that those who adopt land titles may be fundamentally different than those who do not. An experimental approach helps us to separate out any independent effects of forms of land rights from the social and political factors that impact whether individuals have titles. To mitigate challenges associated with the endogenous adoption of titles, we present respondents with a hypothetical community member and randomly vary whether or not this neighbor has a title.

Land titling is rare (but increasing) in both countries, as policymakers have encouraged piecemeal titling to replace customary tenure. Our survey indicates that few (9% of the sample) have state titles for their land. The average surveyed locality in Malawi and Zambia had only 6.5% and 4.7% of their residents with title, respectively; further, the vast majority of surveyed localities in both country had no respondents with titles. There is slightly higher variation among localities in Zambia, with a standard deviation of .096 compared to .077 in Malawi (see Figure A1 in Appendix A). However, across all localities in both countries, 7% feature a rate of titling of 20% or greater.

While there are, of course, limitations to the use of hypothetical vignettes in a survey to understand real world attitudes, this survey experiment is the ideal set-up for testing a new theoretical understanding in the current context, given the challenges of isolating the social impacts of land titling. It allows us to concentrate on the impacts of a strong signal of mutual dependence on expectations. Importantly, our outcomes measure perceptions of the hypothetical neighbor's likelihood to cooperate rather than actual cooperation with a neighbor. As outlined in our theory, this is precisely what we are interested in measuring as it is the foundation for actual cooperation. The level of treatment is the individual, even though the implications of these findings for cooperation are at the community level.

The conjoint set-up presents respondents with a hypothetical neighbor who also varies on the key social cleavages discussed earlier of: ethnicity, migrant status, gender, age, and wealth. Each of these characteristics will likely influence cooperation. For example, given the expectation that land titling would be associated with being a migrant or having higher income, this design helps us to identify separate effects of the titling signal from these other key characteristics. Importantly, we used our survey data to estimate the cor-

relates of titling one's land (see Appendix C). We find that in our sample ethnicity, migrant status, and wealth are important, though varying, predictors of having a title. Other variables such as the size of one's land, the mode of inheritance, and gender/marriage status are not correlated with having a title. This suggests that in our experiment, we do in fact control for the most likely confounding variables. For the experiment, each respondent sees only one profile, and is asked (randomized attributes in bold):

"Imagine you have a neighbor, who is a **[randomly selected ethnic group]**⁷ **[man/woman]**, who is **[25/50]** years old, and whose family **[has lived here for a very long time/migrated here only one year ago from elsewhere in the country]**. Their income is **[higher/the same/lower]** than most people in the village. They **[have access to their land from government papers, and do not rely on traditional leaders to provide land rights / rely on traditional leaders to provide their land rights and have no government papers]**."⁸

After respondents view the profile, they are asked two randomly ordered questions to measure expectations of cooperation. The questions attempt to capture individual and community-oriented cooperation. To measure individual cooperation we asked "Say you had loaned this neighbor some money, would you trust them to pay it back?" This question is meant to capture a one-to-one dynamic in which the respondent must think about the consequences of non-cooperation for their own individual livelihood. While this mechanism is linked to money and thus wealth, we randomly assign the wealth of the hypothetical neighbor, which should limit bias in this response due to perceptions that those with titles are wealthier.

To measure community cooperation we asked "Imagine you are collecting donations to [add a new classroom to the local school OR repair the local health clinic], how likely

⁷For statistical power we limited the ethnic groups in the sample to Chewa, Lambya, Lomwe, Ndali, Ngoni, Senga, Tumbuka, Yao.

⁸The distribution of each treatment condition is uniform and thus does not match the distribution of these attributes in our target population, which creates external validity limitations to our analysis/conclusions. Given data limitations, we are not able to correct this, as suggested by [de la Cuesta, Egami and Imai \(2021\)](#). Instead, we acknowledge that we have opted to maximize internal validity and variation on our key independent variable to advance our understandings of the implications of titling on cooperation, at the cost of external validity

do you think this person would be to help you collect donations?” This question seeks to tap into the community-level impacts of non-cooperation. If neighbors decline to contribute, then health or education in the community will suffer, not just the respondent’s own bank account. We randomly assigned the purpose for the donations in this question not because we expect any differences, but to maximize generalizability beyond a single sector. After the outcomes, we asked three questions to understand the impact of vertical, horizontal, and diffuse obligations. These mechanism questions were presented in random order, but always came after the outcome questions.

Analysis and Results

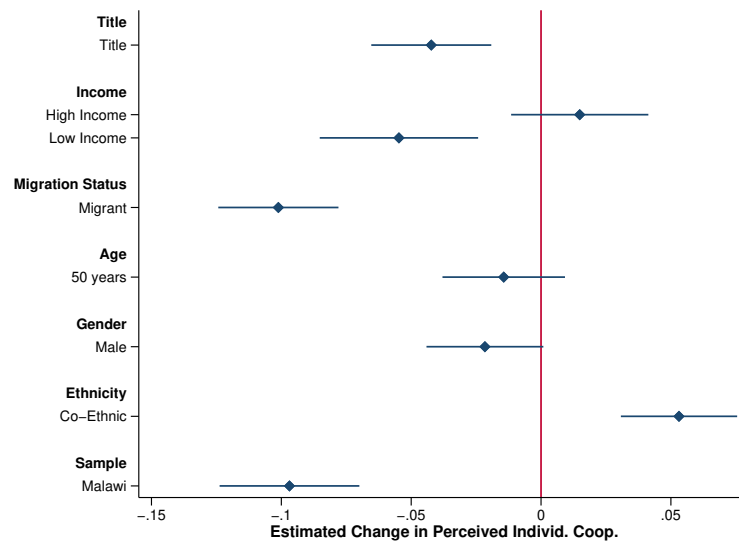
In our pre-analysis plan⁹ (see Appendix F), we specified a number of models to test the expectations outlined above. As our main specification, we present linear probability regression models using the pooled, restricted sample (this model was pre-specified). Despite dichotomous outcome variables,¹⁰ we opted for linear probability models because OLS coefficients are more readily interpretable and the results are robust to logit estimation (see Appendix D). We restricted the sample for the main analysis to only those who do *not* have a title for their land because, as noted in the pre-analysis plan, this most closely matches our theoretical expectations: We hypothesized that those those without a title (who are fully dependent on the CSI) will perceive those with a title (who are less dependent on the CSI) to be less cooperative. We pool our two country samples in the main analysis because the results are remarkably consistent across Malawi and Zambia (see Table B1 in the Appendix). All models control for each treatment in the experiment and cluster standard errors at the sampling locality level (a square kilometer). We control for country (Malawi dummy) in all models estimated using the pooled sample. Summary statistics and the full regression results for the main analysis are reported in Appendix A.

Figure 1 reports the results of the titling treatment on expectations of individual cooperation. This and all other figures report the coefficient estimates for each treatment

⁹The pre-analysis plan was registered with EGAP in June 2019, which was four months before data-gathering was completed. EGAP then migrated its pre-registrations to OSF in February 2020.

¹⁰Trust versus no trust in the hypothetical neighbor to pay back the money – unsure responses are dropped; likely versus unlikely to donate – the likert scale is dichotomized.

Figure 1: Main Treatment Effects: Individual Cooperation (N = 7,242)

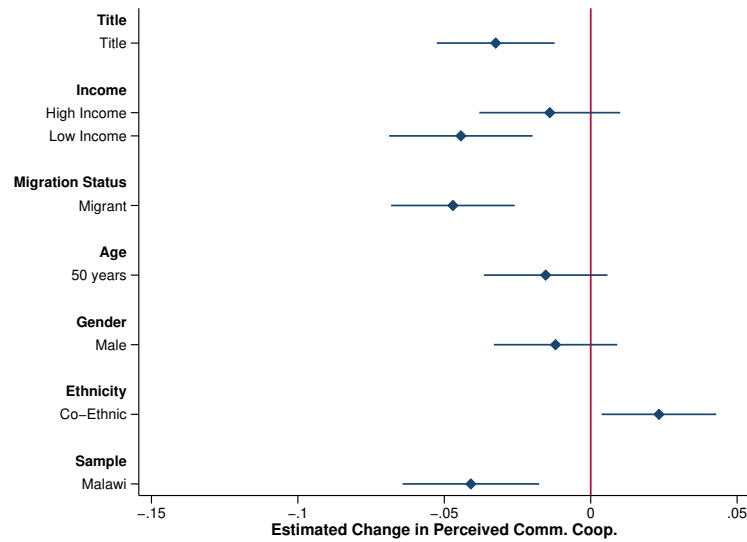


Notes: Each point in the plot is the estimated coefficient from a linear probability model along with its 95% confidence interval. The x-axis represents the estimated effect of each variable on cooperation.

relative to that treatment arm's baseline category (no title, same income as most others, local (non-migrant), 25 years old, female, non-co-ethnic) along with each coefficient's 95% confidence interval. Figure 1 shows that titling significantly impacts perceptions of cooperation: Hypothetical neighbors with a title are significantly less likely to be trusted to pay back a loan compared to those without a title. A title reduces the likelihood of expecting cooperative behavior from the hypothetical neighbor by 4.3 percentage points (pp), which is larger than the negative effect of being male (2.2 pp), but smaller than the effect of being a migrant (reduction of 10.1 pp), coethnic (increase of 5.3 pp) or low income (reduction of 5.5 pp), which are the other significant predictors of individual cooperation.

The results reported in Figure 2 provide further support for the theory of mutual dependence. Having a land title has a significant and negative effect on our second measure of cooperation: perceived community cooperation. In both countries, respondents who received a neighbor with land title in the experiment are significantly less likely to report that the neighbor would help gather donations for the local school or clinic. Titling has an effect size of 3.2pp, which is slightly larger than the positive effect of coethnicity (2.3 pp) and slightly smaller than the negative effect of migrant status (4.7 pp). The effect of recent migrants is unsurprising, given that they are likely to be understood to have weaker ties

Figure 2: Main Treatment Effects: Community Cooperation (N = 6,975)



Notes: Each point in the plot is the estimated coefficient from a linear probability model along with its 95% confidence interval. The x-axis represents the estimated effect of each variable on cooperation.

to the CSI (see [Unruh, Cligget and Hay 2005](#); [Takane 2008](#); [Matchaya et al. 2009](#)).

These results, together, confirm our core hypothesis. They suggest that individuals who secure their property rights *outside* of the local customary institutions are perceived to be less cooperative by those *inside* it. Further, the main effects are consistent across alternative specifications. As outlined in our pre-analysis plan, we estimate the above models for each country individually; using the unrestricted (mixed land rights) sample for each country; and unrestricted pooled. In addition, we also estimated the models with alternative coding for the other treatments: coding ethnicity as whether or not the hypothetical neighbor is from the local majority (restricted, pooled sample); and coding all treatments as shared identities (restricted, pooled sample) with and without controlling for the respondent's characteristics in terms of migration, ethnicity, gender, age, and income.¹¹ And finally, we estimated the models with the inclusion of the interaction between the Malawi dummy indicator and the titling treatment (restricted, pooled sample).

Table 1 reports the coefficients for the titling treatment (and interaction when relevant) for the above-mentioned pre-specified analyses. Each model includes all treatment indicators and clusters standard errors at the sampling locality level as in the main analysis.

¹¹The titling treatment is not coded as shared given that the sample is restricted to those without title.

Across these various models, only the country-specific, unrestricted samples (including respondents who *have* land titles) do not fully support our main findings; however, we should expect that including those with title in the analysis would mute effects. By including respondents with title in the model, the “title” treatment now signals heterogeneous things: For respondents with a title it may indicate higher cooperation and for respondents without a title, it signals lower cooperation.

As we argued above, the negative impact of titling on cooperation should be perceived by those *without* title only. In the unrestricted Malawi sample, titling only has a negative significant effect on community cooperation, and in the unrestricted Zambia sample, there is only an effect for individual cooperation. The null effect of the interaction between the title treatment and the indicator for the Malawi sample further confirms that titling does *not* have differential effects in the two countries.

We also anticipated that the local titling context might condition perceptions of cooperation. While there is minimal variation in titling rates across our sample, we divide our sample into ‘low’ and ‘high’ titling communities by calculating the proportion of respondents in each sampled locality with a title and dividing the sample at the mean (6%). Sub-sample analyses show that the negative effect of titling on expectations of cooperation among those with customary rights is present regardless of the rate of titling in the locality (see Appendix Table B5).¹²

As pre-specified, we estimated interaction models in order to determine if the other treatments condition the effect of titling on expectations of cooperation among the sample of interest (see Appendix B). Overall, the interaction models do not alter our main conclusions, and, in most models, the interactions are not significant. We do find that income and age condition the effect of titling on individual and community cooperation, respectively. However, even in these models, the negative and significant effect of titling persists. And finally, co-ethnicity with the neighbor does not condition the effect of the title signal. This suggests that while co-ethnicity does impact expectations of cooperation in the direction anticipated by existing scholarship, ethnicity’s effect is independent of

¹²This analysis was pre-specified as item 14 in Appendix Table F1. We also estimate models of a number of additional pre-specified sub-samples, reported in Appendix B.

reliance on the local CSI. This confirms our discussion above, that membership in a CSI in these contexts is not equivalent to ethnic identity.

Table 1: Additional Pre-specified Analyses (OLS)

Description	Variable	Individ.	Comm.
Malawi Restricted (Customary Land Rights) (4) (Table B1, Appendix B)	Title	-0.043** (0.017)	-0.036** (0.014)
	N	3629	3518
Zambia Restricted (Customary Land Rights) (5) (Table B1, Appendix B)	Title	-0.042** (0.016)	-0.029** (0.015)
	N	3613	3457
Country Pooled Unrestricted (Mixed Land Rights) (1) (Table B2, Appendix B)	Title	-0.020** (0.009)	-0.024*** (0.009)
	N	12339	11874
Malawi Unrestricted (Mixed Land Rights) (2) (Table B3, Appendix B)	Title	-0.014 (0.012)	-0.030** (0.012)
	N	6789	6604
Zambia Unrestricted (Mixed Land Rights) (3) (Table B4, Appendix B)	Title	-0.028** (0.013)	-0.017 (0.012)
	N	5550	5270
Ethnicity by Village Maj/Min (15)	Title	-0.040*** (0.014)	-0.043*** (0.012)
	N	5452	5272
Shared Identities (16)	Title	-0.042*** (0.012)	-0.032*** (0.010)
	N	7213	6950
Shared Identities w/Respondent Characteristics (16)	Title	-0.040*** (0.012)	-0.030*** (0.010)
	N	7128	6870
Titling Treatment x Malawi Dummy (18)	Title	-0.043*** (0.016)	-0.029** (0.015)
	Title x Malawi	0.001 (0.024)	-0.007 (0.021)
	N	7242	6975

Notes: The numbers in parenthesis after each description link to the pre-specified analyses from the pre-analysis plan listed in Table F1. Where not otherwise noted, the sample is pooled and restricted. Standard errors in parenthesis. As noted in the table, the full regression results for some models are included in Appendix B.

And finally, the title treatment has no effect on expectations of cooperation in a subsample analysis of only respondents with land titles (see Appendix D). This analysis was not pre-specified but provides further support for theory; this is what we should see if it is mutual dependence that strengthens expectations of cooperation.

Exploratory Tests of Mechanisms

Among respondents who rely on the customary institution for their land rights, the title signal exerts an impact on expectations of both individual and community cooperation. Next, we investigate the three mechanisms described earlier: vertical obligations to

comply with authorities; horizontal risk-sharing obligations; and diffuse symbolic obligations. To measure vertical obligations, we asked “If there were a conflict in the village that involved this neighbor, and people went to the headman/woman to resolve it, how likely do you think it is that this neighbor would follow the headman/woman’s orders?”¹³ As noted earlier, village heads are one of the many types of customary authorities that have power within the CSI. We selected them, specifically, because all villages have a headman or woman. To measure compliance with horizontal risk-sharing obligations, we asked “Imagine that there was a well on this neighbor’s land. How likely do you think it is that they would let you use their well?” These two outcomes were coded as one if the hypothetical neighbor was likely to comply with the obligation and zero otherwise. Finally, to measure diffuse obligations, we asked “To what extent do you agree or disagree with the following statement: This neighbor is observing our way of life in this village/neighborhood.” We coded as one all respondents who agreed that the neighbor was “observing our way of life” and zero if the respondent disagreed.

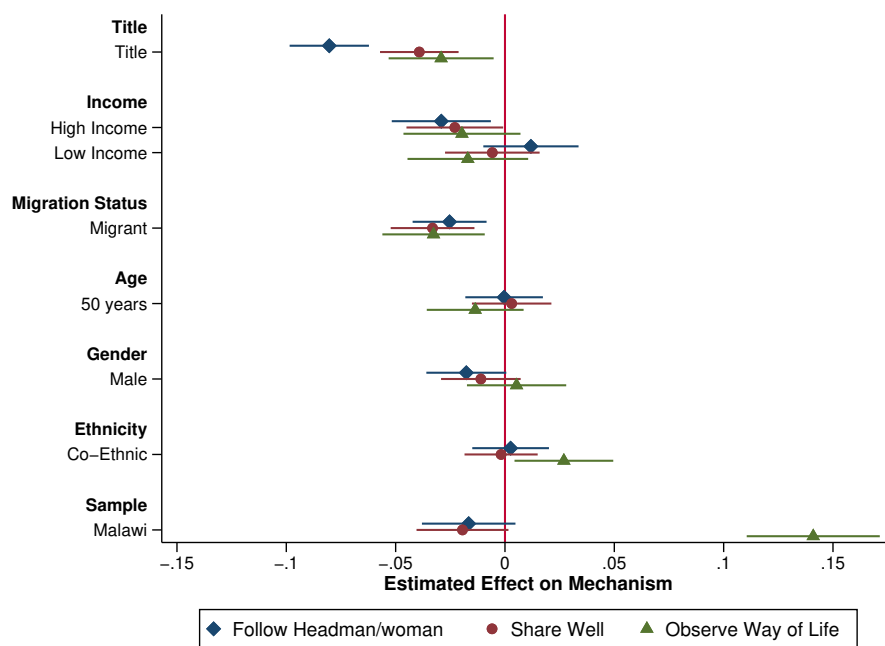
As presented above, we measure these mechanisms post-treatment in the survey, as we expect them to be mediators rather than moderators. Our data do not facilitate a causal mediation analysis (Imai et al. 2011); therefore, we present suggestive evidence here to test the plausibility of each mechanism. As pre-specified (see Appendix F), we estimate the same models as above but with our measures of each mechanism as the dependent variable. We once again report linear probability models (the results are unchanged when estimating logit models, Appendix D).

As reported in Figure 3, the titling treatment has a significant and negative effect on vertical (‘Following Headman/woman’), horizontal (‘Share Well’), and diffuse (‘Observe Way of Life’) obligations in the pooled samples. These findings suggest that all three types of obligations may be actively linking mutual dependence to expectations of cooperation and are therefore worthy of further exploration.

While titling has a negative effect on all three mechanisms, the effect is strongest for

¹³While the community cooperation outcome variable measures willingness to comply with others within the CSI, it is not presented as compliance with the chief or village head explicitly. Therefore, this mechanism more directly measures compliance with the chief/village head. The two variables clearly measure distinct concepts as they are only moderately correlated, $r = 0.3714$.

Figure 3: Mechanism Tests



Notes: Each point in the plot is the estimated coefficient from a linear probability model along with its 95% confidence interval (the bands around each point). The x-axis then represents coefficient values (or the estimated effect of each variable on each mechanism). N = 7,052, 6,945, and 6,788, respectively.

vertical obligations: neighbors with title are 8.0pp less likely to be perceived as willing to comply with chiefs. This compares to a reduction of 3.9pp and 2.9pp for the horizontal and diffuse obligations, respectively.¹⁴ Further, the evidence in support of vertical and horizontal obligations mechanisms is consistent in country-specific analyses. However, the title signal only significantly decreases expectations of observing the locality’s way of life in Malawi. This highlights vertical obligations as the most promising mechanism connecting mutual dependence to expectations of cooperation, while showing that all three obligations do not occur in tandem, even if they are interdependent at times.

Discussion and Conclusions

These results reveal that mutual dependence on CSIs promotes expectations of cooperation among community members. Given prior scholarship demonstrating how beliefs

¹⁴The larger negative effect of titling on vertical obligations is statistically significantly different from its effect on the other two mechanisms, see Appendix D.

about others' contributions generate cooperation (Ostrom 2000; Fischbacher, Gächter and Fehr 2001; Rustagi, Engel and Kosfeld 2010; Thöni and Volk 2018), these findings provide new insight into the determinants of successful and sustained collective action. By contrast, the findings suggest that the introduction of institutional alternatives can erode existing systems of cooperation, because they weaken perceptions of a shared reliance on a CSI. Reductions in mutual dependence impact how community members evaluate the likelihood that their neighbors will comply with different types of obligations enshrined in the institution. Examining these dynamics in relation to institutions that govern property rights in rural Malawi and Zambia allows us to not only build theoretical understandings of the role of mutual dependence, but to contribute new insight into the contemporary process of incremental land titling that is occurring in much of Sub-Saharan Africa. We identify three key takeaways.

First, these findings suggest the need for increased attention to the role of mutual dependence in models of cooperation. This study uses an informational cue that indicates how dependent a hypothetical neighbor is on the CSI for their land rights to show that mutual dependence can shift how community members evaluate others. The results for both individual and collective forms of cooperation are similar across the two country samples: Respondents expect individuals to be less cooperative if they do not share in their exclusive dependence on the customary system to secure their land rights.

Further, the title cue has a clear effect even when respondent were prompted to also consider various social cleavages, including migrant status, wealth, and ethnicity. The results indicate that respondents consider mutual dependence within the CSI separately from other correlates of land titling and cooperation in their communities. For example, we can feel confident that the titling effect is not merely the result of an assumption that an individual with title is wealthier, since respondents reveal that they do not expect wealthier individuals to be less cooperative, and, in fact, perceive low-income neighbors to be less likely to cooperate. Other unobserved correlates of titling that shape individuals' assumptions cannot be fully excluded in such a design, but may still be signals of reduced mutual dependence, albeit through different channels than reliance on the CSI for property rights. For example, respondents might assume that a title holder is less likely to be

engaged in smallholder agriculture or has weaker ties to the community, (which should increase demand for titles in practice).¹⁵ Yet both reduced dependence on local agriculture systems for one's livelihood and outsider status in a community are alternative ways in which mutual dependence could be operating through the title signal. Despite the challenges of excluding all alternative interpretations of the title signal, there is strong evidence that our informational cue of mutual dependence – joint reliance on customary property rights – strengthens citizens' beliefs that others will behave cooperatively.

Second, these findings suggest that mutual dependence impacts expectations of cooperation because it shapes individuals' expectations of whether others can be sanctioned. Our vertical obligations mechanism tests this explicitly. These results thus have implications for other types of CSIs that feature vertical systems of sanctioning, even if they are less hierarchical than the chieftaincy institutions in Zambia and Malawi. It suggests that mutual dependence will likely have an impact within other CSIs where authorities have the ability to punish, including elected community councils or decentralized systems of lineage heads. Yet the connection between mutual dependence and sanctioning also highlights the potential that dependence may contribute to the efficacy of institutions that rely more heavily on social sanctioning as well. In particular, the ability to sanction is central to inter-ethnic cooperation (Fearon and Laitin 1996; Miguel and Gugerty 2005; Habyarimana et al. 2009). If sanctioning is what leads to inter-ethnic cooperation and mutual dependence impacts the ability to sanction, then mutual dependence on CSIs may be what underlies co-ethnic cooperation. In short, it may rather be the case that co-ethnic cooperation is possible because of an underlying system of mutual obligation that need not always be ethnic in nature. This indicates that mutual dependence may contribute to the efficacy of other group characteristics that facilitate collective action, such as native residency or class homogeneity. Further, it suggests that the knowledge alone that an individual is less vulnerable to sanctions may impact collective action by way of expectations of cooperation. Thus fruitful avenues for future research on mutual dependence should examine its impact under various sanctioning systems.

¹⁵71% of title holders in sampled communities primarily used their land for agriculture, compared to 87% of respondents with customary property rights.

And finally, these findings have implications for policies that promote land titling. They show that formalizing one's land rights – an act that has been well-studied for its individual impacts on household investment choices – can have community-level political, social, and possibly even economic effects. Scholars have suggested that land titling can “enhance the economic autonomy of individuals vis-à-vis extended families, community leaders, and the community at large” (Boone 2019, 391) and change the “social fabric” of a community (Chitonge 2019). Our findings are consistent with these insights. They document how, particularly in rural areas with strong customary institutions and few titles, land titling can influence expectations that others will cooperate within a community, suggesting that titling may also impact community members' perceptions of the obligations that individuals have to the local institution and to the state. This could have a variety of effects. By shifting obligations from community to state, titling may function as a form of state or nation-building, for example. In the long-term, it may shape whether citizens rely on customary institutions for public goods or make demands on the state. On the other hand, individual, piecemeal land titling may weaken or transform the existing systems of cooperation and reciprocity in communities. Consequently, our results highlight the need for a more holistic consideration of the impacts of titling in rural Africa: Beyond individual-level costs and benefits, there may be community-level consequences that are unintended and unanticipated by policymakers.

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Appendices

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A Summary Statistics

Table A1: Summary Statistics (pooled, unrestricted sample)

Variable	N	Mean	Std. Dev.	Min	Max
Outcomes/Mechanisms					
Individ. Coop.	12,339	.53	.50	0	1
Comm. Coop.	11,874	.74	.44	0	1
Follow Headman/woman	11,966	.82	.38	0	1
Observe Way of Life	11,546	.67	.47	0	1
Well Use	11,812	.82	.38	0	1
Treatments					
Title	12,362	.49	.50	0	1
High Income	12,362	.34	.47	0	1
Low Income	12,362	.33	.47	0	1
Migrant	12,362	.50	.50	0	1
Age	12,362	.50	.50	0	1
Male	12,362	.50	.50	0	1
Co-Ethnic	12,362	.50	.50	0	1
Majority Ethnic Group	8,918	.09	.28	0	1
Co-Wealth	12,258	.33	.47	0	1
Co-Migrant	12,345	.49	.50	0	1
Co-Age	12,362	.50	.50	0	1
Co-Gender	12,362	.50	.50	0	1
Controls					
Resp. High Income	12,258	.18	.39	0	1
Resp. Low Income	12,258	.40	.49	0	1
Resp. Migrant	12,345	.08	.27	0	1
Resp. Age	12,248	37	16	18	99
Resp. Male	12,362	.38	.49	0	1
Local ELF	10,771	.43	.23	0	.87

Figure A1: Proportion of Those with Title Across Survey Communities

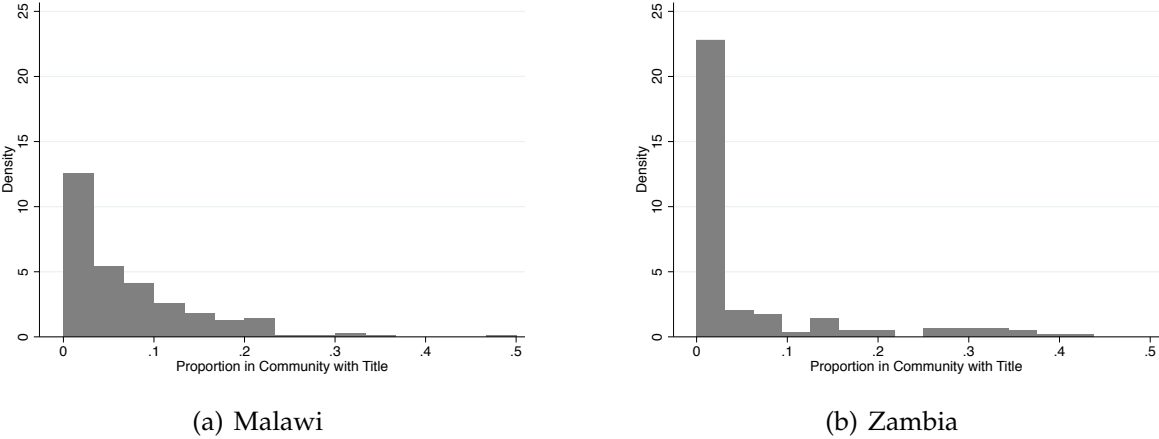


Figure A1 illustrates the distribution of land titles across our sampled localities. We have calculated the proportion of respondents in each locality (1km square areas) with a title and plotted it here for each country. The majority of localities have no respondents with title. Titling rates at the local level tend to be higher in Malawi.

Table A2: Full Regression Output and Logit models for main analysis (see Figure 1)

	Individ. (OLS)	Individ. (logit)	Comm. (OLS)	Comm. (logit)
Title	-0.042*** (0.012)	-0.175*** (0.049)	-0.032*** (0.010)	-0.173*** (0.055)
High Income	0.015 (0.013)	0.062 (0.056)	-0.014 (0.012)	-0.077 (0.067)
Low Income	-0.055*** (0.016)	-0.226*** (0.064)	-0.044*** (0.012)	-0.235*** (0.066)
Migrant	-0.101*** (0.012)	-0.417*** (0.049)	-0.047*** (0.011)	-0.251*** (0.058)
50 years	-0.014 (0.012)	-0.060 (0.050)	-0.015 (0.011)	-0.082 (0.057)
Male	-0.022* (0.011)	-0.090* (0.047)	-0.012 (0.011)	-0.065 (0.057)
Co-Ethnic	0.053*** (0.011)	0.220*** (0.047)	0.023** (0.010)	0.124** (0.053)
Malawi	-0.097*** (0.014)	-0.399*** (0.057)	-0.041*** (0.012)	-0.219*** (0.064)
Constant	0.666*** (0.017)	0.683*** (0.074)	0.828*** (0.015)	1.529*** (0.086)
N	7242	7242	6975	6975

Significance levels: *: 10% **: 5% ***: 1%

Standard errors clustered at the sampling area level.

Restricted sample (Customary Land Rights).

Table A3: Mechanism Models (OLS, see Figure 3)

	Vertical	Horizontal	Diffuse
Title	-0.080*** (0.009)	-0.039*** (0.009)	-0.029** (0.012)
High Income	-0.029** (0.012)	-0.023** (0.011)	-0.020 (0.014)
Low Income	0.012 (0.011)	-0.006 (0.011)	-0.017 (0.014)
Migrant	-0.025*** (0.009)	-0.033*** (0.010)	-0.033*** (0.012)
50 years	-0.000 (0.009)	0.003 (0.009)	-0.014 (0.011)
Male	-0.018* (0.009)	-0.011 (0.009)	0.005 (0.012)
Co-Ethnic	0.003 (0.009)	-0.002 (0.009)	0.027** (0.012)
Malawi	-0.017 (0.011)	-0.019* (0.011)	0.141*** (0.016)
Constant	0.896*** (0.013)	0.885*** (0.013)	0.633*** (0.019)
N	7052	6945	6788

Significance levels: *: 10% **: 5% ***: 1%

Standard errors clustered at the sampling area level.

Restricted sample (Customary Land Rights).

B Additional Pre-Specified Models

Country Restricted Analysis

Here we only report the OLS regression models, but the results are robust to estimating logit models.

Table B1: Models Predicting Cooperation (Restricted Sample by Country)

	Malawi		Zambia	
	Individ.	Comm.	Individ.	Comm.
Title	-0.043** (0.017)	-0.036** (0.014)	-0.042*** (0.016)	-0.029** (0.015)
High Income	0.017 (0.018)	-0.020 (0.018)	0.011 (0.020)	-0.009 (0.016)
Low Income	-0.036* (0.022)	-0.018 (0.018)	-0.074*** (0.022)	-0.072*** (0.018)
Migrant	-0.094*** (0.017)	-0.037** (0.015)	-0.109*** (0.017)	-0.057*** (0.016)
50 years	-0.028 (0.018)	-0.025 (0.015)	-0.000 (0.016)	-0.006 (0.015)
Male	-0.033** (0.017)	-0.011 (0.016)	-0.011 (0.016)	-0.013 (0.015)
Co-Ethnic	0.083*** (0.016)	0.028** (0.014)	0.024 (0.016)	0.018 (0.014)
Constant	0.557*** (0.024)	0.779*** (0.021)	0.680*** (0.022)	0.837*** (0.019)
R ²	0.02	0.01	0.02	0.01
N	3629	3518	3613	3457

Significance levels: *: 10% **: 5% ***: 1%

Standard errors clustered at the sampling area level.

Restricted sample (customary land rights).

Full Sample Models

Here we report the results of logit and OLS models for the full sample, including respondents with land titles. These models were pre-specified as additional tests of hypotheses 2 and 3 on the PAP. (Items 1,2,3 in Table F1). The treatment conditions are all coded as presented in the experiment itself.

Table B2: Models Predicting Cooperation (Full Sample Pooled)

	Individ. (OLS)	Individ. (logit)	Comm. (OLS)	Comm. (logit)
Title	-0.020** (0.009)	-0.080** (0.037)	-0.024*** (0.009)	-0.126*** (0.046)
High Income	0.009 (0.010)	0.036 (0.042)	-0.014 (0.009)	-0.075 (0.050)
Low Income	-0.054*** (0.012)	-0.222*** (0.047)	-0.040*** (0.010)	-0.210*** (0.050)
Migrant	-0.096*** (0.009)	-0.392*** (0.036)	-0.049*** (0.008)	-0.255*** (0.044)
50 years	-0.020** (0.009)	-0.084** (0.037)	-0.016* (0.008)	-0.085* (0.044)
Male	-0.018* (0.009)	-0.072* (0.037)	-0.012 (0.009)	-0.061 (0.045)
Co-Ethnic	0.039*** (0.009)	0.162*** (0.036)	0.013* (0.008)	0.069* (0.040)
Malawi	-0.072*** (0.011)	-0.294*** (0.044)	-0.036*** (0.010)	-0.189*** (0.053)
Constant	0.643*** (0.013)	0.586*** (0.055)	0.822*** (0.012)	1.485*** (0.069)
R ²	0.02	0.01	0.01	0.01
N	12339	12339	11874	11874

Significance levels: *: 10% **: 5% ***: 1%
Standard errors clustered at the sampling area level.
Unrestricted sample (mixed land rights).

Table B3: Malawi Full Sample Models Predicting Individual and Community Cooperation

	Individ. (OLS)	Individ. (logit)	Comm. (OLS)	Comm. (logit)
Title	-0.014 (0.012)	-0.056 (0.050)	-0.031** (0.012)	-0.156** (0.062)
High Income	0.009 (0.013)	0.035 (0.055)	-0.015 (0.013)	-0.075 (0.064)
Low Income	-0.035** (0.015)	-0.142** (0.060)	-0.003 (0.013)	-0.016 (0.065)
Migrant	-0.093*** (0.012)	-0.373*** (0.048)	-0.042*** (0.011)	-0.213*** (0.054)
50 years	-0.030** (0.012)	-0.123** (0.050)	-0.021* (0.011)	-0.108* (0.058)
Male	-0.024** (0.012)	-0.098** (0.049)	-0.006 (0.011)	-0.031 (0.057)
Lambya	-0.010 (0.026)	-0.039 (0.104)	0.003 (0.024)	0.015 (0.121)
Lomwe	0.006 (0.026)	0.024 (0.105)	0.037* (0.021)	0.196* (0.112)
Ndali	-0.029 (0.023)	-0.119 (0.094)	-0.033 (0.023)	-0.163 (0.113)
Ngoni	-0.016 (0.024)	-0.063 (0.098)	0.002 (0.023)	0.011 (0.114)
Senga	-0.051** (0.023)	-0.208** (0.094)	-0.028 (0.023)	-0.136 (0.112)
Tumbuka	-0.036 (0.024)	-0.144 (0.098)	0.015 (0.024)	0.077 (0.121)
Yao	-0.016 (0.025)	-0.063 (0.100)	-0.010 (0.023)	-0.052 (0.115)
Constant	0.608*** (0.024)	0.436*** (0.096)	0.783*** (0.022)	1.269*** (0.116)
N	6789	6789	6604	6604

Significance levels: *: 10% **: 5% ***: 1%

Standard errors clustered at the sampling area level.

Unrestricted sample (mixed land rights).

Table B4: Zambia Full Sample Models Predicting Individual and Community Cooperation

	Individ. (OLS)	Individ. (logit)	Comm. (OLS)	Comm. (logit)
Title	-0.027** (0.013)	-0.111** (0.055)	-0.017 (0.012)	-0.095 (0.066)
High Income	0.007 (0.016)	0.030 (0.066)	-0.014 (0.014)	-0.084 (0.082)
Low Income	-0.080*** (0.018)	-0.327*** (0.075)	-0.088*** (0.014)	-0.475*** (0.077)
Migrant	-0.101*** (0.013)	-0.417*** (0.053)	-0.056*** (0.013)	-0.313*** (0.073)
50 years	-0.008 (0.014)	-0.032 (0.056)	-0.010 (0.012)	-0.053 (0.069)
Male	-0.010 (0.013)	-0.041 (0.056)	-0.019 (0.013)	-0.107 (0.072)
Namwanga	0.018 (0.025)	0.073 (0.104)	-0.013 (0.023)	-0.071 (0.126)
Bemba	0.048* (0.025)	0.197* (0.106)	0.015 (0.024)	0.083 (0.136)
Senga	0.026 (0.026)	0.106 (0.108)	0.007 (0.022)	0.041 (0.127)
Ngoni	0.034 (0.025)	0.141 (0.102)	-0.048** (0.024)	-0.254** (0.124)
Chewa	0.033 (0.025)	0.138 (0.102)	0.019 (0.023)	0.115 (0.132)
Tumbuka	0.019 (0.026)	0.077 (0.107)	-0.019 (0.021)	-0.105 (0.117)
Nyika	0.019 (0.026)	0.080 (0.107)	-0.006 (0.022)	-0.035 (0.124)
Constant	0.644*** (0.024)	0.593*** (0.099)	0.851*** (0.021)	1.675*** (0.123)
N	5550	5550	5270	5270

Significance levels: *: 10% **: 5% ***: 1%

Standard errors clustered at the sampling area level.

Unrestricted sample (mixed land rights).

Sub-Group Analysis

Here we present a number of sub-group analyses to test a variety of alternative explanations. The results show that patrilineal traditions and mode of land inheritance condition the effect of titling on perceived cooperation. To a lesser degree, age also has this moderating effect. However, none of these results are necessarily at odds with the main findings in the paper. All sub-sample analyses use the pooled, restricted sample. The only pre-specified sub-sample analysis we do not estimate is the ESI (ethnicized social institutions) analysis (number 8 in Table B) because the ESI index has not yet been finalized by other members of the research team (the ESI index is part of the larger project of which this survey experiment is a part). However, given that ELF does not differentiate the effects of title, we do not expect ESI to do so either.

It is possible that ethnic diversity conditions the effects of titling. If titling in more diverse areas is more likely to reduce trust, it could drive our above findings. We do not find this to be the case. We split the sample into 'low' and 'high' ELF by divided the sample at the mean value (.39). We calculate the ELF for each sampled area in our survey (1-square kilometer block) using our survey data. We only calculate ELF for sampling blocks in which at least 10 individuals were surveyed (The target was to survey 30 in each sampled area). This measure of ELF is noisy and possibly biased if ethnic groups are geographically clustered within villages. However, this measure is a rough approximation and does account for the immediate ethnic geography of the respondent, which is arguably the most important. We find that the significant effect of titling persists in both low and high ELF contexts.

Patriarchal and/or patrilineal practices may condition the effects of titling. We anticipated heterogeneous treatment effects for the interaction of the gender and title treatment. In a patrilineal institution, we expected that female land titlers might be expected to be less cooperative than male land titlers. A woman with a land title could be seen as diverging from institutional norms to a greater degree than a man in the context of higher patriarchy and land inheritance through the male lineage. Our patriarchy index, though not clearly pre-specified, is operationalized using a question on the survey that asked each respondent to name the five most influential people in the village. We then calculate the proportion of individuals in each locality (1km sampling location) who identify at least one woman as an influential person in the village. We assume that more influential women in a locality is correlated with less patriarchal norms. We split the sample at the mean (10%). To identify those who follow patrilineal traditions, we use a question that asked if land is generally inherited through the male lineage, the female lineage, or both in the community. We then calculated the proportion of individuals who provided each response per locality. The pre-specified sub-sample analysis compares matrilineal and patrilineal communities. However, no community in the sample has majority matrilineal inheritance in 2019. Instead, to gain insight into the role of patrilineality, we code respondents who say women or both as *not* patrilineal.

We find no evidence of an interaction effect of gender and titling overall and in the patrilineal sub-sample. Table B6 presents these subsample analyses, as specified in the PAP. It suggests that differences in local patriarchy do not moderate the effect of title. However, the negative, significant effects of titling are only present in patrilineal localities. This is unanticipated but is likely not the result of the differences in patrilineal and matrilineal institutions, but the differences between communities where respondents report that land is inherited through "both" and where they report that land is inherited through only "men." Inheritance through both female and male lineages is indicative of changing norms of land inheritance in these regions of Malawi and Zambia. We interpret the results of this subsample analysis as indicative that title as a sign of reduced mutual dependence is more effective in areas with more rigid institutional norms (in this case, of patrilineal land inheritance).

Age may also condition the negative effects of titling. Older individuals, who may be more suspicious of changes to local land institutions or be more embedded in the CSI, may respond more negatively to titling. To test this, we split the sample at the mean age and estimate our main models on each sub-sample. We find that age does not influence individual cooperation, but titling only has a significant effect on community cooperation for older respondents. The youth do not seem to see titling as a signal of community cooperation.

Those who are native to the community may be more invested in maintaining customary institutions or have stronger ties of dependence on the CSI, and therefore may have a stronger negative response to a neighbor with title. To test this, we coded whether or not each respondent indicated having been born in the village and then split the samples into native and non-native. The results here show that nativity is not

likely a key factor in determining how individuals respond to titling.

Similar to the previous point, those who inherit their land may have stronger dependence on the CSI or be more invested in customary institutions and thus may respond more negatively toward those who title their land. This is simply an alternative way to think about higher dependence on the CSI even within the sample of those who do not have a title. To test this possibility, we split the sample into those who report inheriting their land through their family and those who acquired their land by other channels. The results suggest that this is likely the case: the negative effect of titling only persists for those who have inherited their land. These results suggest further support for our main argument: when people depend highly on the CSI, they are likely to perceive those who are less-dependent as less cooperative.

And finally, the effects of title on expectations of cooperation may be greater in areas where more people have titled their land because their lives have already been impacted by titling. As the PAP pre-specified, we anticipated titling could have different effects at different equilibria of land rights in a community. Therefore we divide the sample into low and high titling areas by dividing the sample at the mean proportion of people in a locality with a title. The mean is 6%. We find that the effect of titling on cooperation remains regardless of the titling context within this sample, which has overall low rates of titling.

Table B5: Pre-specified Sub-Group Analyses (OLS)

Description	Variable/Sample	Ind. Coop.	Comm. Coop.
(7) Sub-sample by high/low ELF (split at mean)	<i>Low ELF</i>		
	Title	-0.038** (0.018)	-0.042** (0.016)
	N	2989	2889
	<i>High ELF</i>		
	Title	-0.044*** (0.016)	-0.025* (0.013)
	N	4253	4086
(9) Sub-sample by patriarchy index (split at mean)	<i>Low Patriarchy</i>		
	Title	-0.039** (0.016)	-0.035** (0.014)
	N	3778	3645
	<i>High Patriarchy</i>		
	Title	-0.047*** (0.017)	-0.030* (0.015)
	N	3464	3330
(10) Sub-sample by patrilineal/matrilineal	<i>Not Majority Patrilineal</i>		
	Title	-0.033 (0.021)	-0.009 (0.019)
	N	2336	2234
	<i>Majority Patrilineal</i>		
	Title	-0.039** (0.016)	-0.032** (0.014)
	N	3658	3542
(11) Sub-sample by age (split at mean)	≤ 36		
	Title	-0.028* (0.017)	-0.011 (0.015)
	N	3779	3667
	> 36		
	Title	-0.055*** (0.017)	-0.053*** (0.015)
	N	3376	3226
(12) Sub-sample by nativity	<i>Migrant</i>		
	Title	-0.035** (0.015)	-0.028** (0.013)
	N	4591	4422
	<i>Born in Village</i>		
	Title	-0.056*** (0.020)	-0.039** (0.018)
	N	2643	2547
(13) Sub-sample by inheritance of land	<i>Not Family Inheritance</i>		
	Title	-0.021 (0.018)	-0.010 (0.018)
	N	2576	2475
	<i>Family Inheritance</i>		
	Title	-0.055*** (0.016)	-0.045*** (0.013)
	N	4581	4419
(14) Sub-sample by high/low rates of titling	<i>Low Titling</i>		
	Title	-0.047*** (0.015)	-0.030** (0.013)
	N	4434	4260
	<i>High Titling</i>		
	Title	-0.036* (0.019)	-0.037** (0.016)
	N	2808	2715

Interaction Models

As pre-specified, we estimate a separate model that includes an interaction between the titling treatment and one of the other treatments using the pooled, restricted (customary land rights) sample (17).

Table B6: Additional Pre-specified Interaction Models (OLS)

Description	Variable	Ind. Coop.	Comm. Coop.
Titling treatment interactions (17)	Title	-0.064*** (0.015)	-0.045*** (0.013)
	Title x High Inc.	0.063** (0.025)	0.036* (0.022)
	N	7242	6975
	Title	-0.054*** (0.017)	-0.032** (0.015)
	Title x Migrant	0.024 (0.024)	-0.002 (0.021)
	N	7242	6975
	Title	-0.060*** (0.016)	-0.058*** (0.014)
	Title x 50 years	0.036 (0.023)	0.053** (0.020)
	N	7242	6975
	Title	-0.042** (0.016)	-0.028* (0.014)
	Title x Male	-0.000 (0.022)	-0.010 (0.022)
	N	7242	6975
	Title	-0.039** (0.017)	-0.041*** (0.015)
	Title x Co-ethnic	-0.007 (0.023)	0.018 (0.021)
	N	7242	6975

C Titling Profile

Here we investigate the determinants of land titling within each country sample. We conducted this analysis for two key reasons. First, if we can establish that individuals with titles in our sample are no less cooperative than those without a title, then our results from the experiment are less likely to be driven by experiences with less cooperative individuals with titles but rather expectations of lower cooperation from those who are outside the CSI. Second, we can determine which characteristics tend to be associated with titling in our sample area, which will provide evidence of whether or not our experiment controls for these characteristics by randomly assigning them to respondents.

To measure economic standing, we code all those who indicate that their income meets their needs as 'high income' and those for whom their income is insufficient to meet their needs such that their are great difficulties as 'low income'. We include indicators of primary, and secondary or post-secondary education (in each category, someone who has at least some of the relevant education is included in the category, i.e. primary education includes those who had some primary education and those who completed primary education but did not go any further). To identify the local ethnic majority in the village, we used the data from our survey, which includes roughly 30 people in each village. We then coded as one all those who are a member of the local ethnic majority.

The land size measure is the respondent's self-reported measure of the size of their primary plot of land in hectares. Respondents initially reported the size of their land in acres, hectares or square meters. The agricultural land indicator measures whether the respondent reported using land for crops, gardens, or livestock. The inherited land measure includes respondents who reported "being allocated" land from family members or "inheriting" land from a family member.

For the contributions measure, we used the question: "Did you give labor, money, food, or other gifts to support any community initiative since month when survey was taken last year, other than that which we talked about earlier?" The phrase 'other than that which we talked about earlier' refers to taxes that the respondent paid, which was asked about immediately prior to this question.

The local obligation measure is derived from the question: "Are people from name of respondent's village more obligated to help each other, less obligated to help each other or neither more or less obligated to help each other than they are to help people from outside name of respondent's village?" We code responses as 1 if the respondent reported that people have a greater local obligation. Responses of less obligated and neither more or less obligated are coded as 0.

Figure C1 reports the correlates of land titling for each country sample using data on our respondents. The plots in Figure C1 present coefficient estimates from logistic regression models that predict having a title (the dependent variable takes the value of one if the respondent has a government title and zero otherwise). The figures also report the 95% confidence intervals for each coefficient estimate. Our models include a number of variables that may be measures of disadvantage in some contexts (gender and marriage status, income, age), land characteristics (land size, land use, inheritance), insider/outsider status (migrated within 10 years, born in village, ethnicity), and cooperative behavior (made contributions in the past year, feeling of obligation toward the community). We report models with and without the cooperation indicators as they are post-treatment; their exclusion does not change our conclusions.

Overall, a respondent in the Malawi sample could be expected to associate land titles with individuals who: are more educated, have larger land plots, did not access their land through inheritance, and primarily use their land for non-agricultural purposes. In Zambia, the key predictors of title in the sample areas are: being an ethnic minority, non-agricultural land usage, and higher income. In Malawi, migration is negatively associated with titling at $p=.08$, but migration does not predict titling in the Zambia sample. While people who have residential land in the community but not agricultural land (coded as non-agricultural land usage) are more likely to have titles in both samples, the majority of individuals with title in these two samples are agricultural land users (56% in Zambia; 81% in Malawi). Similarly, while there is no association between inheritance and land titling in the Zambia sample, in Malawi, inheritance is negatively associated with titling, indicating that individuals who were allocated land by a chief or purchased it are more likely to have a title than customary property rights. Nevertheless, just over 50% of the households with titles in Malawi access their land through inheritance.

These profiles highlight the importance of considering the potentially confounding effects of wealth and ethnicity in studying the consequences of different types of property rights in these contexts and sug-

gests that respondents may make assumptions about the hypothetical neighbor’s land usage, access, and education that are not addressed in the design. This is a limitation, yet we do not anticipate that residential land use or non-inherited land access should impact expectations of cooperation outside of what they may suggest about an individual’s dependence on the CSI. These results nevertheless reinforce the need to consider key confounding variables by randomly assigning migration, wealth, and ethnicity to the hypothetical neighbor in our survey experiment.

Further, these analyses indicate that individuals with title in the sampled communities are not more or less likely than those without titles to report contributing to a community project in the last year, nor do they differ in what they contributed (labor, money, food, or other gifts). This lack of difference may be due in part to social desirability bias (those with title over-reporting cooperative behavior) or omitted variable bias (degree of local development). Therefore, we are cautious to draw conclusions about how cooperative those with title are in practice.

Table C1: Summary Statistics: Titling Profile (Malawi)

Variable	N	Mean	Std. Dev.	Min	Max
Has a Gov. Title	4,069	.11	.30	0	1
Male Head (Unmarried)	6,797	.10	.29	0	1
Female Head (Unmarried)	6,797	.19	.39	0	1
High Income	6,726	.15	.36	0	1
Low Income	6,726	.44	.50	0	1
Primary Edu.	6,757	.59	.49	0	1
Secondary or Post Secondary Edu.	6,757	.32	.47	0	1
Age	6,759	36	15	18	99
Size of Land (hectares)	4,344	2.16	28.95	.02	1800
Agricultural Land	4,245	.88	.32	0	1
Inherited Land	4,265	.66	.48	0	1
Migrant (10 years)	6,791	.37	.48	0	1
Born in Village	6,791	.30	.45	0	1
Majority Ethnic Group	6,678	.64	.48	0	1
Contributed in the Past Year	6,637	.08	.27	0	1
Local Obligation	6,696	.33	.47	0	1

Table C2: Summary Statistics: Titling Profile (Zambia)

Variable	N	Mean	Std. Dev.	Min	Max
Has a Gov. Title	3,902	.07	.25	0	1
Male Head (Unmarried)	5,563	.11	.31	0	1
Female Head (Unmarried)	5,563	.23	.42	0	1
High Income	5,532	.21	.41	0	1
Low Income	5,532	.35	.48	0	1
Primary Edu.	5,553	.55	.50	0	1
Secondary or Post Secondary Edu.	5,553	.31	.46	0	1
Age	5,489	37	16	18	97
Size of Land (hectares)	3,784	6.50	41	< .01	1200
Agricultural Land	3,857	.83	.37	0	1
Inherited Land	3,997	.60	.49	0	1
Migrant (10 years)	5,554	.35	.48	0	1
Born in Village	5,554	.31	.46	0	1
Majority Ethnic Group	5,521	.64	.48	0	1
Contributed in the Past Year	5,390	.15	.36	0	1
Local Obligation	5,477	.44	.50	0	1

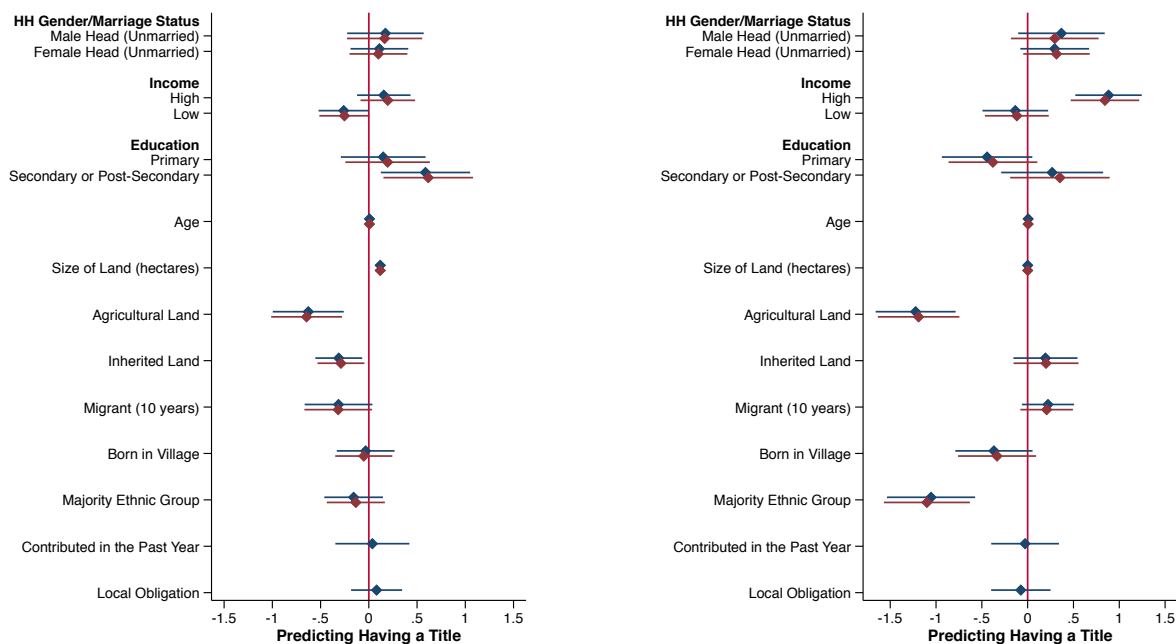
Table C3: Summary Statistics for Landowners with Title (Country pooled)

Variable	N	Mean	Std. Dev.	Min	Max
Male Head (Unmarried)	721	.14	.34	0	1
Female Head (Unmarried)	721	.22	.41	0	1
High Income	715	.29	.45	0	1
Low Income	715	.28	.45	0	1
Primary Edu.	720	.44	.49	0	1
Secondary or Post Secondary Edu.	720	.47	.50	0	1
Age	719	39	17	18	88
Size of Land (hectares)	700	8.23	76	< .01	1800
Agricultural Land	697	.71	.45	0	1
Inherited Land	693	.51	.50	0	1
Migrant (10 years)	721	.31	.46	0	1
Born in Village	721	.30	.46	0	1
Majority Ethnic Group	709	.51	.50	0	1
Contributed in the Past Year	708	.11	.31	0	1
Local Obligation	711	.39	.48	0	1

Table C4: Summary Statistics for Landowners *without* Title (Country pooled)

Variable	N	Mean	Std. Dev.	Min	Max
Male Head (Unmarried)	7,249	.09	.29	0	1
Female Head (Unmarried)	7,249	.20	.40	0	1
High Income	7,249	.16	.37	0	1
Low Income	7,229	.41	.49	0	1
Primary Edu.	7,245	.60	.49	0	1
Secondary or Post Secondary Edu.	7,245	.27	.44	0	1
Age	7,163	38	16	18	99
Size of Land (hectares)	7,003	3.77	28	< .01	1200
Agricultural Land	6,951	.88	.33	0	1
Inherited Land	7,165	.64	.48	0	1
Migrant (10 years)	7,242	.27	.44	0	1
Born in Village	7,242	.37	.48	0	1
Majority Ethnic Group	7,150	.69	.46	0	1
Contributed in the Past Year	7,101	.13	.33	0	1
Local Obligation	7,182	.41	.49	0	1

Figure C1: A Profile of Those with Title



(a) Malawi; N = 3,638 (full) and 3,732

(b) Zambia; N = 3,241 (full) and 3,347

In both plots, the blue coefficients indicate estimates from the full model while the red estimates are from the model that excludes post-treatment variables (contributions and local obligation). Differences across the two sets of models are negligible.

D Additional Checks

Tables D1 and D2 report the results of logit models for the main OLS models results reported in the paper (as well as the main models for each individual country). The results are consistent across OLS and logit estimation.

Table D1: Logit Models Predicting Individual and Community Cooperation

	Pooled Individ.	Pooled Comm.	Malawi Individ.	Malawi Comm.	Zambia Individ.	Zambia Comm.
Title	-0.175*** (0.049)	-0.173*** (0.055)	-0.174** (0.070)	-0.184** (0.073)	-0.178*** (0.068)	-0.166** (0.082)
High Income	0.062 (0.056)	-0.077 (0.067)	0.068 (0.074)	-0.102 (0.092)	0.048 (0.086)	-0.055 (0.099)
Low Income	-0.226*** (0.064)	-0.235*** (0.066)	-0.146* (0.088)	-0.090 (0.089)	-0.310*** (0.093)	-0.396*** (0.096)
Migrant	-0.417*** (0.049)	-0.251*** (0.058)	-0.383*** (0.068)	-0.189** (0.075)	-0.455*** (0.070)	-0.322*** (0.090)
50 years	-0.060 (0.050)	-0.082 (0.057)	-0.116 (0.072)	-0.124 (0.078)	-0.001 (0.068)	-0.032 (0.085)
Male	-0.090* (0.047)	-0.065 (0.057)	-0.136** (0.068)	-0.056 (0.080)	-0.045 (0.066)	-0.075 (0.082)
Co-Ethnic	0.220*** (0.047)	0.124** (0.053)	0.336*** (0.065)	0.144** (0.073)	0.101 (0.068)	0.103 (0.078)
Malawi	-0.399*** (0.057)	-0.219*** (0.064)				
Constant	0.683*** (0.074)	1.529*** (0.086)	0.232** (0.099)	1.251*** (0.110)	0.747*** (0.094)	1.606*** (0.114)
N	7242	6975	3629	3518	3613	3457

Significance levels: *: 10% **: 5% ***: 1%

Standard Errors Clustered at the Sampling Area level. Restricted sample (customary land rights).

Table D2: Logit Models (Mechanism Tests)

	Vertical	Horizontal	Diffuse
Title	-0.558*** (0.063)	-0.273*** (0.064)	-0.136** (0.057)
High Income	-0.195** (0.077)	-0.159** (0.078)	-0.091 (0.064)
Low Income	0.086 (0.081)	-0.042 (0.079)	-0.079 (0.066)
Migrant	-0.175*** (0.060)	-0.231*** (0.068)	-0.152*** (0.056)
50 years	-0.004 (0.063)	0.021 (0.065)	-0.063 (0.052)
Male	-0.122* (0.064)	-0.077 (0.064)	0.026 (0.054)
Co-Ethnic	0.017 (0.062)	-0.013 (0.059)	0.125** (0.054)
Malawi	-0.116 (0.076)	-0.136* (0.075)	0.648*** (0.071)
Constant	2.076*** (0.098)	1.986*** (0.100)	0.561*** (0.088)
N	7052	6945	6788

Significance levels: *: 10% **: 5% ***: 1%

Standard errors clustered at the sampling area level.

Restricted sample (customary land rights).

Table D3 provides the results of the placebo analysis: estimating the main models on only those who do have a government land title. We find that titling does not influence perception of cooperation among those with title. All respondents in this analysis do not depend exclusively on the CSI for their land rights, so the impacts of titling on cooperation as theorized in the paper are not expected to hold.

Table D3: Placebo Analysis (Sample = Only Those With Title)

	Individ.	Comm.
Title	0.018 (0.038)	0.018 (0.032)
High Income	-0.061 (0.044)	-0.051 (0.040)
Low Income	-0.053 (0.045)	-0.033 (0.035)
Migrant	-0.108*** (0.037)	-0.019 (0.031)
50 years	0.024 (0.037)	0.026 (0.032)
Male	-0.056* (0.033)	-0.044 (0.033)
Co-Ethnic	0.037 (0.039)	0.040 (0.032)
Malawi	-0.073* (0.042)	-0.055 (0.037)
Constant	0.675*** (0.057)	0.818*** (0.048)
N	718	680

Significance levels: *: 10% **: 5% ***: 1%

Standard Errors Clustered at the Sampling Area level.

For the mechanisms, we also calculated z-scores for the difference between the title treatment coefficients across each mechanism model. This allows us to determine if the coefficients are in fact statistically significantly different (Clogg 1995).¹⁶ The z-scores are reported in Table D4. The differences between the vertical obligations coefficient and the other two are statistically significant.

Table D4: Test of Significant Across Mechanism Models

Model	Title Coeff (st. err.)	Diff.	z-score
Vertical Obligations	-0.080 (0.009)	-0.041	-3.165
Horizontal Obligations	-0.039 (0.009)		
Vertical Obligations	-0.080 (0.009)	-0.051	-3.337
Diffuse Obligations	-0.029 (0.012)		
Horizontal Obligations	-0.039 (0.009)	-0.010	-0.654
Diffuse Obligations	-0.029 (0.012)		

¹⁶Clogg, Clifford C., Eva Petkova and Adamantios Haritou. 1995. "Statistical Methods for Comparing Regression Coefficients Between Models." *American Journal of Sociology* 100(5):1261–1293.

E Ethics and Consent

With this study, we did not foresee (or encounter in actual fact) any major ethical challenges. There, of course, always exists risk and ethical issues when conducting research with human subjects, but these were minimal in our case. The larger survey asked questions about daily life, economic activities, and governance that are commonly discussed in casual conversation. While the survey experiment focused on titling and its potentially negative ramifications, it was never presented in such a way as to create any divisions or animosities between those with and without title; not only would that be unethical but it would undermine the whole research enterprise. We took great efforts to ensure that this was avoided by never asking directly or insinuating that there would be reason to distrust those with title. Nor did we ever indicate that customary or statutory land rights were superior or more desirable than the other in the survey questions or enumeration.

To ensure that respondents were properly protected and supported, informed consent was received for each survey. In addition, participants were reminded that they could stop the survey at any time if they were uncomfortable in anyway. Participants were not paid either as incentive in the experiment or for their participation in the survey more generally. The participant pool was diverse as it was a random sample of local communities and thus did not target any specific groups. While vulnerable people were included (older people and the poor), they were not overly burdened by the survey nor targeted specifically to join. While the data gather for this study was primarily among poorer, rural communities, the larger project also surveyed urban localities. We have no reason to believe that this study disproportionately benefited or harmed any particular groups. Even the results of the study should not harm any particular group as it provides reasons to believe that both customary and statutory land rights systems can be improved upon.

This study received research ethics and regulatory approval from the National Committee on Research in the Social Sciences and Humanities in Malawi. In Zambia, it received approval from the University of Zambia Humanities and Social Sciences Research Ethics Committee IRB.

F Anonymized Pre-Analysis Plan

This pre-analysis plan was registered with the Evidence in Governance and Politics (EGAP) registry on June 11, 2019. We have only included here the hypothesis and analysis sections as the background and introduction sections are largely replicated in the paper. We note that our language surrounding some aspects of the study have changed since pre-registering (e.g., we discuss distrust rather than individual cooperation in the pre-analysis plan), but the general intuitions and expectations are the same.

Theory and Hypotheses

One core prediction follows from treating land titles as a social cleavage: land titles may introduce a division among community members that produces distrust. Having to comply with the institutional rules enforced by the village head and chief to access land builds group cohesion for the untitled community members. Those who are outside of the customary institutional rules share in common greater independence from the customary institution and deeper integration with the state. Beliefs within each group that their form of property rights is legitimate may further exacerbate inter-group distrust. *Thus, land titling may divide the community and generate inter-group distrust.* We therefore expect that:

Hypothesis 1 *Those who title their land will be seen with greater distrust by those who rely solely on customary property rights.*

Hypothesis 2 *Those who title their land will be seen as less cooperative by those who rely solely on customary property rights.*

We argue that the key mechanism linking titling to distrust is collective cost, which we define as the costs that the community (i.e. village) as a whole suffers. For our current purposes, we are concerned with

the costs communities pay as individuals within begin to title their land. Individuals may perceive three different collective costs – social order, symbolic, and risk-sharing – when others in the community change from customary property rights to land titles.

First, land titling may undermine the existing system of social order in which everyone must comply with the conflict resolution of the customary institution (as executed by the village head/chief), for fear of losing residency or land rights. Consider the example from the previous section of two individuals who dispute the boundary between their plots of land. How might the outcome of compliance change if one of the aggrieved parties has a title for her land and therefore has the option not to comply with the village head's ruling? If this is the case, neither the village head nor the chief can take this person's land or expel them from the village. Given that the customary authorities cannot enact their key punishments, this individual cannot be held accountable by these institutions in domestic, land, or other community disputes. Other members of the community may see these actions and therefore have less trust in and be less willing to work/cooperate with this individual in the future given that she refuses to comply with the most powerful local authorities.

Second, there may be symbolic collective costs to land titling. Titling one's land may be perceived by others in the community as a rejection of local (or traditional) culture and way of life. By titling one's land, an individual symbolically rejects the customary authority's legitimacy by removing their core source of power/authority in relation to that individual's behavior. Others in the community are then less likely to trust such individuals and a lack of trust likely has negative effects on willingness to work with such an individual when it comes to community needs.

Third, land titling may have collective costs in the form of loss in risk-sharing land tenure systems. The complex sets of secondary and collective rights provided by customary land tenure systems include "insurance" or a "hedge against environmental uncertainty" (Runge 1986, p.625). Land titling may decrease trust and cooperation because it breaks down secondary land rights that other members of the community rely on. It allows individuals to fence their land and sell it to whomever they choose without considering the rest of the community. The shift from some elements of collective rights to an individual exerting exclusive rights may generate distrust and reduced cooperation.¹⁷

Individuals and communities are clearly motivated to title (or not title) their land by a variety of different considerations: wealth, age, position in the community, minority status (in any number of ways), pressure from urban relatives, land scarcity, the price of land, etc. Importantly, demand for land titles should be higher among the marginal members of a community (e.g. not connected to the village headman/woman or the chief) because their land rights under the customary system are less secure (Honig 2022). However, we expect that chiefs are more likely to give permission (when such permissions are required) to title to those with connections to the chief or social privilege, e.g., those who are less marginal. Therefore, there is a clear tension between those who demand and can title land. We will therefore also seek to construct a profile of "potential land titlers" and a list of the drivers of demand for land titling as part of this project. These variables will be important control variables in our analysis below. More importantly, this will give us an idea of what people believe or assume about those who title their land.

Further, given that chiefs recognize the connection between control of land and their own power, some chiefs have attempted to title plots of land in their own personal names or their children's names. This is rare but it leaves open the possibility that a land title could be seen as increasing the wealth of the chief. However, we expect that even where this has occurred, the collective costs to the customary institution and the community are still relevant. By contrast if most land in the community is already titled or community

¹⁷Our core expectation that land titling will reduce trust and cooperation in a community treats property rights as a binary option between *either* customary institutions *or* a state land title. However, some individuals may choose to title a portion or all of their land, while also engaging with the chief to protect their land security. They may attempt to obtain tenure security from both, then invoke whichever one is likely to lead to the most favorable outcome given a specific situation. Nevertheless, titling any land is a change in local tenure systems and should be perceived as costly. However, the more common mixed land security arrangements are within individual households, the less important we expect land titling to be as a social cleavage in the community. In such cases, the line between the in- and out-group may be blurrier. The study is designed to allow us to measure and take into account potential differences in local practices related to within-household mixed property rights.

norms of conflict resolution, collective action, and risk-sharing/secondary land rights systems are limited, then we would not expect individuals to perceive collective costs to titling.

We assume that if land titling leads to lower trust and cooperation, then this constitutes a relevant social cleavage. But more importantly, we care about land titling as a social cleavage because when titling undermines trust and cooperation (in the way social cleavages are theorized to do), then it can potentially undermine the (theoretical/expected) development benefits of land titling. In short, the purpose of the project is not to prove that land titling is a social cleavage but rather to approach land titling as a social cleavage to better understand its social and political outcomes.

Context and Social Identity Hypotheses

We expect that titling will be received with more distrust when it more drastically disrupts the status quo. On the other hand, if the new title reinforces existing power dynamics, it should have less impact on community relations. This insight leads us to a set of hypotheses regarding how the effect of land titling on cooperation/trust will vary depending on different contexts across communities.

First, ethnic diversity may condition the effects of titling. In a relatively more diverse context, if certain ethnic groups title at higher rates, then titling may reinforce existing community divisions, which will likely heighten the negative effects of titling. However, if ethnic groups title at roughly similar rates, then titling will cross-cut ethnic divisions, which may reduce the salience of ethnic divisions and expand trust and willingness to cooperate across ethnic lines. In such a context, it is also possible that the new titling division in society will further fragment it and thus reduce trust and cooperation overall. In more homogeneous communities, titling may divide previously cohesive ethnic groups, which could prove quite disruptive to a previously minimally divided society. In short, ethnic diversity may interact with titling in a number of ways. It is unclear from the outset which is most likely; therefore, we contend that ethnic diversity will condition the effects of titling but do not propose a specific hypothesis in this regard.

Closely related, the salience of ethnicity in daily life at the village level (what we term ethnicized social institutions, ESI) may condition the effect of land titling. If ethnicity is a more salient division (independent of the level of diversity) in a society, then titling may seem less salient and have a minimal impact unless certain ethnic groups title at higher rates, which would further increase the salience of ethnicity. If certain ethnic groups title at different rates and ethnicity is less salient, titling may increase the importance of ethnic divisions. Once again, the salience of ethnicity is likely to matter, but the direction of the effect is less clear.

Gender is also likely to influence trust and cooperation in the context of titling. We expect a stronger negative effect of land titling on trust and cooperation towards women titlers among male respondents in highly patriarchal contexts. Further, in patrilineal social institutions, where land is inherited through the man's lineage, we should see stronger negative effects towards women than in matrilineal social institutions among male respondents. Among female respondents in patriarchal and/or patrilineal contexts, the expectations are ambiguous. Some female respondents may express distrust/low cooperation for women who defy social norms. However, we may see that some female respondents socially-reward women who defy gender norms, by expressing increased cooperation and trust. Therefore, we expect stronger negative responses from men and ambiguous responses from women. Therefore, with reference to male respondents only, we hypothesize the following:

Hypothesis 3 *In more patriarchal contexts, women titling will exacerbate the negative effects of land titling.*

Hypothesis 4 *In patrilineal societies, women titling will be perceived more negatively than in matrilineal societies.*

In addition, the position of the respondent within the local community should generate different responses. First, those who are more integrated into the community and community rules/norms (older, non-migrants, inheritors of land) should be more likely to express distrust or non-cooperation towards land titlers than less-integrated respondents as the former have more at stake in maintaining the status quo and strength of customary institutions. Second, respondents who share salient characteristics with a titler should be less likely to express distrust or non-cooperation (co-ethnics, both are migrants, both are older, shared gender, shared class). When the titler and the respondent are in the same social group (and share

more social identities), titling will be less likely to reduce trust and willingness to cooperate. By contrast, titling may be seen as more threatening when the titling individual and respondent belong to different social groups.

Hypothesis 5 *Older individuals will be more likely to express distrust toward and be less willing to cooperate with land titlers.*

Hypothesis 6 *Individuals who were born in the community will be more likely to express distrust toward and be less willing to cooperate with land titlers than recent migrants.*

Hypothesis 7 *Individuals who inherited their land will be more likely to express distrust toward and be less willing to cooperate with land titlers than respondents who purchased their land.*

Hypothesis 8 *Individuals will be more likely to express trust toward and be more willing to cooperate with land titlers who share their ethnic, migratory, age, class, and gender group identities.*

The degree to which titling has taken place in a locality may also condition any social cleavage effects. We expect there to be a non-linear relationship between the number of people with titles in a community and whether titling generates trust and intolerance. There should be thresholds: when there are no community members with titles or the majority have titles, then the perceived social costs of titling will be less salient. When titling has already created tensions in the community but the balance has not shifted to everyone seeking titles, we should see the strongest effect.

Hypothesis 9 *Individuals living in areas where some but not most community members have titles (e.g. intermediate levels of titling) will be more likely to express distrust or non-cooperation towards land titlers.¹⁸*

Country Context Hypotheses

The comparison across countries provides leverage on understanding the impacts of the balance of power among traditional leaders, the relationship between local institutions and land control, and land scarcity on the effects of land titling on trust and cooperation. The laws and policies of the two countries have established different roles for traditional leaders, even within the same ethnic groups. We expect this to have implications for how titling disrupts the status quo of customary control over land.

The distribution of power within the customary institution may shape how titling impacts the community. Local authorities that have power over land allocation have incentives to emphasize the collective costs of titling to their communities. However, some local authorities have more contact with individual village communities, (i.e., village heads), and others have less direct contact because they oversee many villages, (i.e., "Traditional Authorities" in Malawi and "Chiefs" in Zambia). Therefore, we expect that when village heads have greater power over land distribution than chiefs, the community will have a stronger negative reaction to land titling. They will be more likely to be reminded of the collective costs.

We expect that chieftaincy institutions are more decentralized in Malawi than in Zambia; on average, village heads are stronger in Malawi than in Zambia. In Malawi, the Group Village Heads and Village Heads are formally recognized by the state.¹⁹ This contrasts with Zambia where the role of headperson is under the jurisdiction of the chief. There, village heads are chosen by chiefs and lineages within the community. They have no official status in relation to the state or salary. Therefore, we expect that more decentralized authority is associated with a stronger sense of collective costs and thus hypothesize the following:

Hypothesis 10 *Individuals in customary institutions with decentralized authority over land will be more likely to express distrust and non-cooperation towards land titlers.*

¹⁸It is unclear at this stage if we will have enough variation in titling across communities in our sample to test this hypothesis.

¹⁹Government of Malawi, Chiefs Act, 1967.

Further, the link between land control and the power of the customary institution should also condition the impact of titling on community relations. Titling will be received more negatively when the control of land rights is more closely tied to the influence of customary institutions. Importantly, as discussed above, customary authorities in Malawi have less de facto authority to repossess land than in Zambia. Therefore, we should expect titling to have a more negative effect on trust and cooperation in Zambia given that titling of land in this context is more disruptive to the sanctioning authority of customary leaders. Therefore, we hypothesize the following:

Hypothesis 11 *The greater the influence of customary institutions over land, the greater the negative impact of titling on community relations.*

The scarcity of land, which varies across countries (as well as localities) may also condition the impact of land titling. Given Malawi's higher population density, we expect that citizens will experience greater levels of land scarcity. Therefore, titling will be a more contentious issue. We therefore hypothesize the following:²⁰

Hypothesis 12 *If land is perceived to be more scarce, land titling should have a stronger negative impact on trust and cooperation.*

Alternative Hypotheses

Rather than creating divisions within a community as hypothesized above (Hypotheses 1 and 2), land titles may generate cohesion within the community by providing greater security to households with precarious land rights within the customary system. Customary institutions can be highly unequal, such that women, youths, migrants, ethnic minorities, and low-caste lineages have weaker property rights than those with high status within the community (Boone 2014; Joireman 2011). Land titles may help integrate those with low privilege into the community. By formalizing their residency in the community, land titles may allow some individuals to more actively participate. *Land titling may incorporate those without strong customary property rights and strengthen their commitment to the community.* It is important to note that this expectation predicts the opposite of Hypotheses 1 and 2, which is our core hypothesis.

Given the intra-group cohesion that develops from relying on different institutions for access to land, it follows that *land titles may function as a cross-cutting cleavage.* Land titles introduce a new identity category in the community that reflects a narrative of modernity and institutional innovation. This modern identity, which looks towards the state as the legitimate authority over land, may be stronger than other identity-based cleavages. Similarly, individuals with customary property rights may unite across existing cleavages in their resistance to or resentment of the new forms of property rights.²¹

Analysis

Here we present our proposed analysis to test the above hypotheses. Table F1 presents a summary of the various samples/sub-samples, treatment codings, and interactions we expect to engage with in the analysis.²²

²⁰We also anticipate a number of alternative explanations: the authoritarian swing in Zambia may exacerbate the negative effects of titling; titling may be more disruptive in the poorer context of Malawi; the survey will take place in greater proximity to the national elections in Malawi, which, insofar as titling is a campaign issue, may influence how titling impacts our outcomes of interest.

²¹This, of course, assumes titling is not an exact reflection of existing social identities; i.e., if titling is restricted to only certain ethnic groups or lineages, then titling would be a reflection of existing cleavages. We will test this assumption in the data. If we do find that titling fully aligns with an existing social division, we still have the opportunity to test whether titling exacerbates the existing social divisions.

²²While the various analyses contained in this table are numbered for ease of reference, they are not ranked in the original PAP in any way. In the original PAP (as seen in this Appendix), we do not specify which models we place the most weight on except for the models that use the restricted sample in a very general sense.

Table F1: Description of Analyses

Aspect	Description	Relevant Hypotheses
Samples	(1) Full, country pooled	Hyp. 1 & 2
	(2) Full, Malawi	Hyp. 1 & 2
	(3) Full, Zambia	Hyp. 1 & 2
	(4) Restricted, Malawi	Hyps. 1 & 2, 10 – 12
	(5) Restricted, Zambia	Hyps. 1 & 2, 10 – 12
	(6) Sub-sample by the 3 mechanisms (using restricted samples only)	Hyp. 1 & 2
	(7) Sub-sample by high/low ELF (split at median)	
	(8) Sub-sample by high/low ESI (split at median)	
	(9) Sub-sample by patriarchy index	Hyp. 3
	(10) Sub-sample by patrilineal/matrilineal	Hyp. 4
	(11) Sub-sample by age	Hyp. 5
	(12) Sub-sample by nativity	Hyp. 6
	(13) Sub-sample by inheritance of land	Hyp. 7
	(14) Sub-sample by high/low rates of titling	Hyp. 9
Coding of Treatments	(15) As presented in experiment (but ethnicity by village maj/min)	All but 8
	(16) As shared identities with the respondent (but titling coded as presented in experiment) ²³	8
Interactions	(17) Titling treatment x [all other treatment dimensions]; one included in a model at a time (restricted sample)	Extension of Hyps. 1 & 2
	(18) Titling treatment x Malawi dummy; as alternative to country sub-samples (restricted sample)	Hyps. 1 & 2, 10 – 12

Descriptive Analysis

This design allows to construct profiles within each region and country of the characteristics of individuals who: 1) title their land, 2) support titling in their communities, and 3) do not support titling in their communities. These three profiles help identify clearly the most compelling reasons for citizens to seek titles for their land and also the reasons why some do not want them. This likely will reflect some of the local power dynamics or inequalities explored in this design. These profiles are an important descriptive contribution to a literature that has assumed that all citizens want and would benefit from land titles.

Testing Hypotheses 1 and 2

Our core analysis identifies the impact of land titling on community relations. Our dependent variables (see above for operationalization) are trust and cooperation. Our vignette has multiple social cleavage dimensions and presents a single profile to each respondent. As with other conjoint experiments, the independent randomization of each attribute in the vignette allows us to identify the relative impact of each individual treatment on these outcomes. Therefore, the main analysis is a regression of each individual outcome measure on the treatment conditions to determine the size and significance of the effect of each treatment. We would run this regression on the full sample, on a restricted sample of only those respondents who do not have a title on their own land (which we expect will be roughly 90% of our sample), on each country sample, and on the restricted sample for each country. The restricted samples allow us to more clearly isolate the effect of titling on those without a title, the key social division with which we are concerned. The country samples will allow us to compare the effect of titling in the two countries. We will also estimate models (on the full and restricted samples) in which we interact a country dummy variable with the land titling treatment indicator to more directly compare the effect of titling in the two countries. These results allow us to identify the impact of each treatment, while controlling for the other dimensions. The core treatment indicator for the study is whether or not the hypothetical individual titled their land.

Second, we will also interact each pair of attributes (e.g. migrant who titles) to see the conditional effects of the various attributes. This would allow us to see which combinations of social cleavage dimensions have the largest effects on community relations. While not explicitly hypothesized above, we are particularly interested in how land titling combines with other attributes. For example, we expect that non-co-ethnic land titlers face greater social sanctions than co-ethnic land titlers. We expect similar relationships for shared gender, migratory status, and age groups if they are in fact salient divisions in a community. For

dichotomous outcomes, we will primarily use logistic regression. However, to more easily interpret substantive effects, we will also estimate OLS regressions. For likert scale outcomes variables, we will recode them to be dichotomous (e.g. likelihood questions coded as likely or unlikely).²⁴

One concern in this research question is whether an effect of land titling on social cohesion represents an independent (or new) cleavage or is a reflection of existing cleavages. We know that certain profiles are more likely to seek land titles and to access land titles. The conjoint experimental design allows us to identify the impact of land titling with the other social cleavages randomly varied. However, we can employ a few strategies to more closely provide evidence of an independent titling effect. First, our profiles of households that have titles in each country allows us to do some sub-sample analyses. Among the most likely group to have titles, how does titling impact respondent perceptions? Similarly, we can also do this with existing social cleavages. How does titling impact respondent perceptions among the most salient existing cleavage? This sub-sample analysis should defray any concerns that the titling cleavage is really a measure of an existing cleavage.

The social cleavage conditions are coded as majority/minority in the village, migrant/local, male/female, title/non-title, youth/older, low/average/high income. Therefore, these codings do not consider the respondent's status on the variable. This allows us to first identify how respondent perceptions shift according to the broader social context in the community. Thus we can see whether both women and men, on average, judge a female titler more harshly.

Testing the Mechanisms behind Hypotheses 1 and 2

Our set of mechanisms driving distrust of titlers relates to the collective costs of land titling. We expect that respondents may have decreased trust of those with land titles because they believe titling 1) undermines social order, 2) is a symbolic loss, and 3) changes collective land sharing systems. We include specific questions for each of these forms of collective costs. We also have a second measure of these beliefs in the question of whether titling is good or bad for the community and why. Since these mechanism questions are asked after the treatment and thus perceived to be mediating variables, to test the plausibility of each mechanism, we estimate the same models as above but in this case our DVs are the mechanism measures. Our outcomes will be based on responses to the mechanism questions (e.g., 0 = agree titling undermines social order while 1 = it does not).

Remaining Hypotheses

First, to test the effect of ethnic diversity, we will estimate village-level ELF scores using our survey data. We will then interact the ELF score with the titling treatment to test the conditioning effect of diversity on titling. We will also construct a measure of the salience of ethnicity (ESI) and interact that with the titling treatment to test the conditioning effect of ethnic salience.

To test Hypothesis 3, we construct a village-level patriarchy index using survey questions on decision-making within the community. Sub-sampling this analysis by the patriarchy index tests whether women titling in patriarchal contexts elicits a greater negative response than in low-patriarchy contexts. To test for the separate (but related) role of inheritance practices that favor a woman's lineage or a man's lineage, Hypothesis 4, we will split the sample into individuals who follow patrilineal and matrilineal practices and estimate our main model. (Note: this is the model that codes the treatment variables, with the exception of ethnicity, as they appear in the experiment on each). For Hypotheses 5, 6, and 7, we will split the sample by age (using the median to divide the sample), nativity (was the respondent born in this village/not), and land acquisition (we ask each respondent how they acquired their land and will split the sample into those who inherited their land and those who did not), respectively. We will once again estimate our main model on these sets of sub-samples.

²⁴Given pilot data from May 2019, we may need to divide the sample between those who say "not at all likely" and everyone else as, from the pilot data, it seems that this divides the sample more evenly. It also suggests that those who respond so strongly negatively to the questions are likely quite different. The sample was only 47 respondents so analysis of this data was not possible but merely suggestive of potential patterns.

To identify the effect of shared identities (Hypothesis 8), we will code the treatment conditions as co-ethnic/non-co-ethnic, shared gender, shared age (closer to 25 or closer to 50), shared income/class (by matching relative income of hypothetical individual with the respondent's relative income, measured elsewhere in the survey), and shared migrant status. However, given that few in our sample will actually have titles, we will leave the titling code as it appears in the experiment (unless we have sufficient variation in titling to estimate the model coding it as shared title status).

We may not be able to test Hypothesis 9 given that we may not obtain sufficient variation in the degree of titling in a village. However, if we are able to, we will divide the sample into those who live in villages with a critical mass of titlers and those with little-to-no titlers. We may take a more qualitative approach to this using cases studies of any villages with high titling that are included in the sample.

With regards to the country-level hypotheses, if we find that the effects of titling are more negative in Malawi compared to Zambia, then we will conclude that Hypothesis 10 and 12 are confirmed and will conclude that Hypothesis 11 is not (the latter predicts a more negative effect in Zambia).