Received: 10 August 2018 | Revised: 1 April 2019 | Accepted: 21 May 2019

DOI: 10.1111/agec.12512

ORIGINAL ARTICLE

AGRICULTURAL ECONOMICS
The Journal of the International Association of Agricultural Economists

WILEY

How do informal farmland rental markets affect smallholders' well-being? Evidence from a matched tenant–landlord survey in Malawi

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Abstract

We estimate the efficiency and equity returns to farmland rental markets in Malawi using a matched tenant–landlord survey of smallholder farm households in four districts. Our sample allows us to more fully observe the landlord side of the rental market, which is almost always missing in previous studies. Our results suggest that land rental markets promote efficiency by facilitating a net transfer of land to more productive farmers. We also find that land rental markets promote equity as conventionally defined in the land markets literature, that is, by transferring land from land-rich households to land-poor households, and from labor-poor to labor-rich households. However, our study identifies some important challenges for land rental markets in this context. First, we find that tenants in our sample are wealthier than their landlord counterpart on average in all dimensions other than landholding. In addition, most landlords report the motive for renting out their land as either the need for immediate cash, or the lack of labor and/or capital to cultivate the plot that was rented out. These findings align with concerns about potential "stress renting" by poor landlords and suggest the value of defining equity along a broader set of dimensions other than simply equalizing the distribution of farmland and labor.

KEYWORDS

land rental markets, landlords, Malawi, sub-Saharan Africa, tenants

JEL CLASSIFICATION

D63, O12, Q15

1 | INTRODUCTION

Recent empirical evidence on African land rental markets would seem to be in keeping with the general features of an African structural transformation, as outlined in seminal studies by Johnston and Kilby (1975), Mellor (1976), and others. Several recent studies find that land rental markets in SSA promote "equity," defined as the transfer of land from labor-poor to labor-rich households, and from land-rich to land-poor households (Chamberlin & Ricker-Gilbert, 2016; Holden, Otsuka, & Place, 2009; Jin & Jayne, 2013). In addition, these studies find that land rental markets promote production efficiency by transferring land from producers with lower farming ability to those with higher ability.

Despite the general finding of positive benefits from renting in land, numerous questions remain about how these markets improve equity and efficiency in the smallholder farming system for both tenants and landlords. One of the major challenges associated with previous literature is that most studies in the region severely underreport the activities

of landlords. In fact, a recent article by Deininger, Savastano, and Xia (2017) uses nationally representative LSMS-ISA data from six countries in SSA collected within the past 5 years to show that total area rented out makes up less than 50% of total area rented in.[1] Furthermore, rented out land makes up less than 6% of rented in land in the Malawi, Nigeria, and Uganda datasets. The failure of most studies to fully capture the supply side of the rental market at best leaves out important details as to the landlords' intentions, and at worst, biases any results and conclusions that are drawn from such research.

Several anecdotal reasons for landlords under reporting their activities in surveys have been advanced. They include (a) landlords in customary tenure areas being reluctant to discuss renting out land because they fear that they could lose their cultivation rights if they are found not to be farming; (b) land rental modules in surveys not being crafted properly to capture rented out land, and survey enumerators not being instructed to probe respondents about land rented out; and (c) landlords residing in other, possibly urban, localities and not being available for interview. Evidence of (a) would be a symptom of tenure insecurity in the land rental system. Should the problem be found to be associated with (b) it would suggest problems with the design and implementation of land tenure modules in large surveys such as LSMS-ISA (Holden, Ali, Deininger, & Hilhorst, 2016). Conversely, evidence of (c) would be consistent with an indigenous African land grab where urban dwellers are acquiring land from poorer rural smallholders and leasing it to them on a seasonal basis (Anseeuw, Jayne, Kachule, & Kotsopoulos, 2016; Jayne et al., 2016; Sitko & Jayne, 2014).

With these considerations in mind, the present study uses recently collected data on tenants and their matched landlord pairs from Malawi to measure the efficiency and equity returns to informal land renting. Our work is motivated by the following questions: would the seemingly positive benefits for land rental markets in terms of promoting equity and efficiency found in other studies hold if tenants and landlord households are observed equally in the dataset? Are the missing landlords not present in the LSMS and other datasets the rich urban dwelling households? In answering these questions, we make three important empirical contributions to the existing literature. First, as mentioned, we overcome the problem of landlord under reporting rental activities discussed above by collecting and analyzing a matched tenant and landlord survey of smallholder households in Malawi. Because we observe both the supply and demand sides of the land rental market, we are able to more fully measure the economic returns of renting for both tenants and landlords. Understanding both sides of the rental markets is crucial for making accurate land use policies and development programs.

[1] The focus countries are as follows: Ethiopia, Malawi, Niger, Nigeria, Tanzania, and Uganda.

To our knowledge, no study in SSA that estimates the efficiency and equity impacts of land rental markets uses a matched tenant–landlord sample, and the few studies that have used a matched tenant–landlord sample focus on answering different questions than the ones raised in the present article. For example, Deininger, Ali, and Alemu (2013) use a matched sample to estimate the relative differences in Marshallian efficiency among share-cropped plots, plots rented at a fixed rate, and owner-operated plots in Ethiopia. Bellemare (2012) uses a matched sample from Madagascar to estimate how a landlord's perception of his or her tenure security affects the choice of contract offered to tenants. He finds that landlords who feel insecure are more likely to offer share-cropped contracts as opposed to fixed-rent contracts. Ghebru and Holden (2014) use a matched landlord-tenant sample from Ethiopia to assess bargaining power, efficiency, and distributional implications. They find that a landlord's demographic characteristics matter for efficiency and more resource-poor and tenure insecure, female landlords use rented land less efficiently. In addition to answering different questions from our study, the articles mentioned above are conducted in places where the majority of the rental arrangements are share-cropped, as opposed to our context in Malawi where nearly all of the rental arrangements are fixed-rent.

Second, the previous studies, using unbalanced samples, that have attempted to estimate the efficiency impacts of land rental markets have done so using the fixed effect (FE) component of a production function as a proxy for a farmer's unobserved ability (Chamberlin & Ricker-Gilbert, 2016; Deininger & Jin, 2005; Deininger & Mpuga, 2009; Jin & Deininger, 2009; Jin & Jayne, 2013; Lanjouw, 1999). This approach, while innovative, has the shortcoming of being unable to distinguish between farmer ability and all other time-constant unobservable factors—such as soil quality, farmer risk aversion, time preferences, and ability—which are subsumed in the FE term. To overcome these issues, we collect proxies for each of these measures and incorporate them as covariates in the models that we estimate. This allows us to more accurately measure how they affect land rental decisions.

The third contribution of our article is that we allow for land rental decisions to be made in a two-step process using a double hurdle (DH) model. The DH model lets us account for the fact that the decision to participate in land rental arrangements as either a tenant or a landlord and the amount that the individual choses to rent in or out may be different, and that the same factor may affect the participation and use decision in different ways (Wooldridge, 2010). To our knowledge, all of the previous studies that consider equity and efficiency of land rental markets estimate the rental decision in one step using a Tobit estimator. The DH provides more flexibility than the Tobit, as it allows us to generate new insights about tenants' and landlords' rental market participation decisions.

Our identification strategy takes advantage of the fact that our matched tenant–landlord sample allows us to employ pairwise FE to control for unobservable differences between tenants and landlords who participate on opposite sides of a rental arrangement. We estimate the differences within pairs that affect land rental decisions and ultimately efficiency and equity. We also have a rich set of household-level demographic information, and indicators of "grit"/perseverance, risk aversion, and present bias, that should control for much of the remaining time-constant and time-varying unobservable factors that might bias our coefficient estimates. We recognize that even with good controls and pair-specific FE, we cannot assume full causality of our results.

Our results suggest that land rental markets do facilitate production efficiency, as rental arrangements transfer land from landlords with lower grit and education to tenants with higher grit and education. However, our balanced sample suggests that tenants are wealthier than their landlord pairs across all dimensions other than landholding (a finding consistent with Chamberlin and Ricker-Gilbert [2016]). Furthermore, most landlords report that they rent out their land because they need immediate cash or lack the labor and/or capital to cultivate the plot that was rented out. These findings support the concern about what has been called "stress renting" by landlords (Deininger et al., 2013; Chamberlin & Ricker-Gilbert, 2016; Gebregziabher & Holden, 2011; Teklu & Lemi, 2004). These landlord households seem to be willing to part with their most important asset (land) to meet short-term consumption needs rather than renting out land to earn cash that they use to engage in other more remunerative employment or investment opportunities. This raises the concern of whether or not land rental markets actually contribute toward structural transformation in this context. Our findings also highlight the need to define equity along a broader set of dimensions other than just equalizing the distribution of farmland and labor as has been done in the past (see various chapters in the book by Holden et al. [2009], along with Deininger, Ali, and Alemu [2008a], Jin and Deininger [2009], and Jin and Jayne [2013]).

2 | BACKGROUND: LAND RENTAL MARKETS IN MALAWI

Malawi officially maintains three types of land tenure systems—public, private (freehold or leasehold), and customary (traditional).[2] Owners of private land hold title to it, so their rights are recognized and protected by the government. Freehold land is owned by the titleholder and can be used in perpetuity; leasehold land gives the operator (lease holder) explicit cultivation rights for a specified duration of time (often 99 years). Private land can be bought, sold, and rented at the discretion of the titleholders.

The vast majority of land in Malawi (including land cultivated by smallholders) falls under the traditional tenure system.[3] For example, Lunduka, Holden, and Øygard (2009) estimate that in the 1970s, 80% of all arable land was under customary tenure, and by 1997, less than 10% of that land had been converted to private land.[4] The traditional tenure system grants user rights (not ownership rights) to households and is managed under the auspices of local traditional authorities (chiefs). Those rights can normally be passed down from parents to children. However, chiefs officially have the authority to reallocate land as they see fit. Buying, selling, and renting of land is not explicitly allowed in the customary system, although it is often allowed in a de facto manner with the endorsement of the chiefs.

Recent empirical evidence suggests that growth in land rental markets within the customary land tenure system has been remarkable over the past 15–20 years in Malawi. Chamberlin and Ricker-Gilbert (2016) use nationally representative data to show that between 2002/2003 and 2006/2007, the proportion of smallholders in the sample who were engaged in land rental markets either as tenants or landlords increased from 11% to 20%, and in 2008/2009 participation increased to 24% of the sample. They find that rental market activity is driven by small and declining farm sizes, population density, and market access. In fact, the median area under cultivation per smallholder household in Malawi is just 0.6 ha, while Malawi's rural population is growing at an estimated rate of over 3.0% per year and is expected to reach 20.8 million by 2020 (National Statistical Office, 2008).

In recognition of the importance of land markets and land tenure, the government of Malawi passed a series of Land Acts late in 2016. One of the objectives of the Land Acts, which had been circulating in parliament since 2002, is to make it easier for smallholders to obtain formal titles for the land that they cultivate. Households who cultivate land within the customary system will be allowed to register their land and obtain titles for it without paying a registration fee—a major barrier to titling for limited resource farmers in the past (Namfuko, 2017). The hope is that this will improve tenure security for poor households, particularly those headed by women and youth (Deininger, Xia, & Holden, 2019). The impact of the 2016 Land Acts on land sales and rentals remains to be seen, but one might expect the law to facilitate their further development.

[2] Malawi also has designated public lands that are claimed by state entities. These lands include forest reserves, game parks, and other protected areas. Officially public lands are not supposed to be used for agriculture, but in reality, smallholders encroach upon these lands.

[3] The nationally representative IHS3 data from 2010 indicate less than 2% of smallholder plots were purchased with title.

[4] Though dated, these are the most recent figures available for Malawi.

3 | PREVIOUS LITERATURE ON LAND RENTAL MARKET EFFICIENCY AND EQUITY IMPACTS

As land rental market activity has grown across SSA in recent decades, so have the number of research studies estimating their impacts on smallholders. An important conceptual discussion, from Skoufias (1995), suggests that rental markets have the potential to allow smallholders to adjust their operational farm size to reach their desired farm size, either through renting in or renting out land. However, in the presence of transaction costs, which include finding, negotiating, and enforcing rental agreements, the costs of monitoring land management by tenants and the pressure not to rent out too much land lest a household be perceived as excessively wealthy, such adjustment might not be fully possible. This means that an observed operational farm size is not necessarily equivalent to the operator's optimal or desired farm size.

Several studies have estimated the degree to which land rental markets allow households to adjust their operational land size to their desired land size and measure the extent that transactions costs affect adjustment. Generally, number of hectares rented in or rented out is regressed on ex ante landholding and household size or available labor, and other factors using a Tobit estimator to account for nonparticipation. Coefficient estimates on the land and labor variables allow inferences to be drawn on the extent to which land rental markets promote what is referred to as equity. For example, by transferring land from land-rich households (more land ex ante) to land-poor households (less land ex ante), and from labor-poor households (less available labor ex ante) to labor-rich households (more labor available ex ante). To our knowledge, these studies are all imbalanced with more observations for tenants than for landlords (Chamberlin & Ricker-Gilbert, 2016; Deininger et al., 2008a; Deininger, Ali, & Alemu, 2008b; Ghebru & Holden, 2009; Jin & Jayne, 2013; Kimura, Otsuka, Sonobe, & Rozelle, 2011; Yamano, Place, Nyangena, Wanjiku, & Otsuka, 2009). The general conclusion across studies is that (a) land rental markets allow for adjustment toward optimal farm sizes but full adjustment is rarely attained due to the presence of transaction costs; and (b) there are equity gains as land is transferred from land-rich to land-poor households and from labor-poor to labor-rich households.[5]

Some studies also seek to add a measure of production efficiency to the analysis of land rental market impacts. The method for doing so, first presented in Lanjouw (1999), entails estimating the FE component from a production function, and including that component as an additional covariate in the Tobit estimate of hectares rented in and rented out. To date, this method has been applied to a number of local contexts in Asia and SSA (Chamberlin & Ricker-Gilbert, 2016; Deininger & Jin, 2005; Deininger & Mpuga, 2009; Jin & Deininger, 2009; Jin & Jayne, 2013). All of these samples are also unbalanced, with more observations for tenants than for landlords. The general finding is that households with higher ability are more likely to rent in land (e.g., estimates on the FE coefficient are positive and statistically significant in the land rented in models). On the landlord side of the market, the coefficient estimate is either not statistically significant or negative and statistically significant.

Regardless of these findings, the fact that the landlord side of the market has not been fully observed in previous studies raises questions about the true benefits from these markets for all participants. The literature that exists generally supports the notion of "stress renting" by landlords. For example, Kusunose and Lybbert (2014) find that in Morocco landlords rent out land as a coping mechanism to earn cash in response to drought. In a study in Ethiopia, Gebregziabher and Holden (2011) find that fixed-rent contracts appears to be a coping mechanism following droughts, that is, to enable landlords to satisfy urgent cash needs, even when sharecropping arrangements were the norm. They conclude that such contracts were generally sub-optimal, reflecting short-term needs and weak bargaining power of landlords. Previous literature suggests that in Malawi landlords experience lower net incomes and are more likely to be in poverty than tenants and other households, even after accounting for the income that they earn from renting out land (Chamberlin & Ricker-Gilbert, 2016). This raises the question: why would someone part with their most productive asset, even temporarily, unless they were under financial duress or were coerced into doing so? It is possible that the missing landlords in most datasets are urban dwellers who may be better-off than the landlords who live in the same village as tenants are more likely to be found for interview by enumerators and seem to be of more limited resources. The present study intends to inform this issue by looking at efficiency and equity returns to renting in and renting out land for a matched sample of tenants and landlords.

4 | METHODS

To estimate the effect of land renting on efficiency, and equity in the smallholder agricultural sector of Malawi, we consider a nonseparable farm household model following Singh, Squire, and Strauss (1986). As mentioned earlier, the contribution of the present article is empirical, but the empirics are based on the conceptual model for land renting presented and discussed in numerous previous studies on the topic, including Chamberlin and Ricker-Gilbert (2016), Deininger et al. (2008a),

[5] Recall our assertion that these findings should be treated with caution, as the landlord side of the market is not fully observed in the data used by these studies, possibly biasing results.

Jin and Deininger (2009), Jin and Jayne (2013), and Skoufias (1995), and the various chapters in Holden et al. (2009). We first consider household j's decision whether or not to enter into the land rental market as either a tenant or landlord, or to remain autarkic and not participate in the market. We model the decision as follows:

$$R_j = \delta_1 A_j + \delta_2 L_j + \delta_3 G_j + \delta_4 D_j + \delta_5 P_j + \mathbf{H}_j \delta_6 + v_j, \quad (1)$$

where R represents the number of hectares that a household rents in or rents out in a given season. This decision is a function of numerous factors including number of members in the household as a proxy for family labor. This is represented by A, with δ_1 as the corresponding parameter to estimate. Following previous literature, should $\hat{\delta}_1 < 0$ in the hectares rented out equation and $\hat{\delta}_1 > 0$ in the hectares rented in equation, it would suggest that land rental market transfer land from labor-poor to labor-rich households. The variable L represents pre-rental landholding by the household, which includes all land that is cultivated by the household (excluding rented in land) in addition to land that will be rented out, and land that is fallowed, used as a woodlot or in pasture.[6] The parameter of interest is represented by δ_2, and consistent with previous literature on the topic; a coefficient estimate of $\hat{\delta}_2 > 0$ in the hectares rented out equation and $\hat{\delta}_2 < 0$ in the hectares rented in equation would indicate that rental markets transfer land from land-rich to land-poor households.

As mentioned earlier, previous studies attempt to determine if rental markets promote production efficiency following Lanjouw (1999) where the FE component from a household-level production function is included as a covariate in a model of area rented in/out, as in Equation (1) above. Our model seeks to advance the literature by creating observable proxies to disentangle the different unobservable household-level factors that are lumped into the FE component of a production function. The first proxy is denoted by the variable G, which is our measure of "grit" or "perseverance and passion for long-term goals," built from the psychology literature (Duckworth, Peterson, Matthews, & Kelly, 2007).[7,8] We construct this measure by asking all survey respondents to answer the same set of eight questions that describe how well they believe a certain characteristic describes them. We then convert these questions into a scale with possible scores from 8 to 40 (see Appendix A for the actual scale that was used in the survey). Using this scale to construct G allows us to proxy for how perseverance and determination affect the efficiency of land rental markets. To our knowledge, this is the first article to use this explicit measure in a model of land renting in or out, although it has been used recently in other economic contexts (see Lybbert & Wydick, 2018). If the coefficient estimate for grit is $\hat{\delta}_3 < 0$ in the hectares rented out equation and $\hat{\delta}_3 > 0$ in the hectares rented in equation, it would indicate that land rental markets transfer land from producers with less grit to producers with more grit.

Second, we create a proxy to elicit risk aversion from respondents in the survey. Doing so allows us to arguably disentangle risk aversion from other household characteristics that the previous literature treats as unobservable, or lumps into a FE component. Our measure of respondent risk aversion is represented by D with corresponding parameter δ_4. Just like in the questions measuring grit, respondents are asked hypothetical questions about their preferences for winning a certain amount of money or playing a lottery with a chance to win nothing and a chance to win a greater sum of money (see risk aversion questions in Appendix B).

In addition, the respondent's level of present bias is represented by P with δ_5 as a parameter to estimate. Respondents are asked questions about receiving an amount of money now or waiting a certain amount of time to receive a larger sum of money. These measures are built from the seminal work measuring risk aversion by Holt and Laury (2002), along with Ashraf, Karlan, and Yin (2006) and Gine and Karlan (2014) (see present bias questions in Appendix C).[9]

Equation (1) also contains a vector of household-level demographics noted by $\mathbf{H}$, with δ_6 as the parameter vector to estimate. Whether or not the household is headed by a female is included as a binary variable in $\mathbf{H}$. Previous research suggests that female-headed households are much more likely to rent out their land than they are to rent in, most likely because of resource constraints (Deininger et al., 2013). Age of the household head and education of the household head are also included in $\mathbf{H}$, along with the inverse hyperbolic sine (IHS) transformation of household durable and livestock

[6] Land may also be borrowed in where one household lets another household cultivate their land with no money exchanged. For the purpose of this analysis, we consider borrowed land to be rented land at a zero price.

[7] The previous literature attempts to use the FE component to proxy for ability, while we create a proxy for "grit" that is also not the same as "ability." Regardless, grit is plausibly related to the likelihood of making productivity-enhancing investments (and possibly more so than "ability" even when "ability" is cleanly measured). We are reassured that our grit measure is performing consistently with our conceptualization by observing that the sign is as expected in all model specifications. Furthermore, because the other coefficients in our models are not significantly affected by whether or not the grit measure is included, we are reassured that this is not a problematic variable in our econometric specifications (see Tables 4–7 in the Results section).

[8] Given that we have cross-sectional data at the household level, we cannot run the Lanjouw FE specification to compare with our model.

[9] Ideally, we would have created the measures for grit, present bias, and risk aversion using revealed preferences by playing these "games" with real money rather than asking questions hypothetically. We chose not to do this because this survey tool was already heavy and burdensome for enumerators. They had to (a) find tenant/landlord pairs, (b) take GPS measurement of subplots, (c) coordinate with soil technicians to collect soil samples, (d) conduct the survey, and (e) play risk preference and grit games without real money. We felt like if we made (e) revealed preference with money that the enumerators had to manage themselves, it would have be too much additional burden.

assets.[10] The IHS-transformed value of household monetary savings is also included in **H**. One of the important questions surrounding the landlord side of the market is whether or not credit and liquidity constraints (e.g., the need for cash during planting time) may induce households to rent out some or all of their land, effectively prioritizing short-term needs over longer-term benefits. Using an unbalanced sample with landlords underreporting, Chamberlin and Ricker-Gilbert (2016) present evidence suggesting that such "stress rentals" are prevalent in Malawi. Inclusion of the savings variable, along with assets, age, and education, tells us the extent to which these factors affect land renting and can provide further evidence of "stress renting" or not. District-level dummies are also included in **H**, and correspond to the location of the land, not the district of the household's residence, if they are different. The household-specific error is represented by v in Equation (1).

4.1 | Identification strategy

Our primary concern for identifying the coefficients of interest in equation (1) is that there may be correlation between the error terms and the observed covariates due to omitted variable bias. People do not randomly enter into rental contracts with each other, so we are concerned that some unobservable factors that may determine the decision to be a tenant or landlord could also be correlated with observed covariates in our model. We deal with this in two ways. First, by adding the rich set of controls as mentioned above including proxies for household grit, risk aversion, and present bias we are able to bring those factors out of the error term. To test the robustness of our results, we present parsimonious specifications where only the key variables of interest are included in our study and compare these specifications with a model that includes full controls.

Second, we test the robustness of the estimates in Equation (1) using a method similar to Bellemare (2012) and Deininger et al. (2013) that exploits the within variation of our tenant–landlord pairs. By matching tenants with their landlord pairs and ignoring autarkic households we can create a pair specific FE. Now the rental decision of household j in rental pair p, originally shown in equation (1), is specified as follows:

$$R_{jp} = \delta_1 A_{jp} + \delta_2 L_{jp} + \delta_3 G_{jp} + \delta_4 D_{jp} + \delta_5 P_{jp} + \mathbf{H}_{jp}\delta_6 + \alpha_p + \varepsilon_{jp}, \quad (2)$$

where the covariates and parameters to estimate are the same in Equation (2) as in Equation (1) except for the fact that the error term now has two components. The pair-specific FE is represented by α, which captures unobserved differences within tenant–landlord pairs that could influence the rental decision. Such unobservables include social and power dynamics and social connections within the rental partner pair. Our use of the pair-specific FE allows us to control for potential correlation between these factors and the covariates in our models. Autarkic households are not included in the pair FE models but are included in the other models. The individual specific error term is represented by ε. It is assumed to be independent and identically distributed, conditional on observed covariates and α.

4.2 | Estimator choice

For robustness, we compare estimates of factors affecting land rented in and rented out using three estimators. First, we use pair FE as discussed above. Doing so estimates the impacts for the tenants and landlords who are in a rental arrangement and excludes autarkic households. We also follow the previous literature by estimating these models with autarkic households included using a Tobit estimator. The Tobit is appropriate in this context because tenants and autarkic households do not rent out land, and landlords and autarkic households do not rent in land, so the dependent variables take on properties of a corner solution variable with many zeros (Wooldridge, 2010).

Third, we add to the previous literature by also estimating Equation (1) using a DH model that estimates R in Equation (1) in two steps (Hurdles). Hurdle 1 is a probit estimate of participation in land rental markets and hurdle 2 is a truncated normal regression of the amount of land rented in/out. The DH model is also a nonlinear corner solution model like the Tobit that allows us to include autarkic households in the estimation. The DH model is more flexible that the Tobit because it allows us to account for the fact that the decision to participate in land renting as either a tenant or a landlord and the amount that the individual choses to rent in or out may be different. In addition, the DH considers that the same factor may affect the participation and use decision in different ways (Wooldridge, 2010).

To our knowledge, no other study has estimated land rental market participation using a DH. However, several other studies have measured land rental market participation using a two-step estimator to deal with potential selection bias (see Ghebru & Holden, 2009; Holden, Deininger, & Ghebru, 2011; Lunduka et al., 2009; Yamano et al., 2009). The models used in the aforementioned studies are different than a two-stage DH model used in our article, because we use it to estimate if there are different mechanisms that govern the decision to participate in land rental markets and the decision about the amount of land to rent in or out. We use pair FE and a rich

[10] The inverse hyperbolic sine transformation is defined as $\log(y + [(y^2 + 1)^{(1/2)}])$, where y is the untransformed variable. It is similar to a logarithmic transformation but does not drop observations with zeros. Because most of this function's domain approximates that of a logarithm, the associated coefficient estimates can be interpreted as one would for a log-transformed variable (MacKinnon & Magee, 1990).

set of controls deals with endogeneity/selection bias in rental pair formation, at least partially in our article. However, we acknowledge that with all studies using observational data, we can never fully remove potential endogeneity or selection bias concerns. Regardless, we believe that our analysis uncovers important relationships that are understudied to date.

In our DH model, all observations, rental pairs, and autarkic households are included. In hurdle 1, the dependent variable is equal to 1 if the household rents in land (in the land rented-in model) and 0 otherwise. Conversely, the dependent variable is equal to 1 if the household rents out land (in the land rented-out model) and 0 otherwise. Hurdle 2 is estimated via a truncated normal estimator and is hectares rented in (in the land rented-in model) and hectares rented out (in the land rented-out model). Thus, in the land rented-in model, landlords and autarkic households have zeros for the dependent variable, whereas tenants and autarkic households have zeros for the dependent variable in the land rented-out model.[11]

Standard errors in the pair FE estimates are clustered at the rental-pair level to control for serial correlation and heteroscedasticity. The Tobit and DH estimators assume normality, so the standard errors are not clustered in these models.[12]

5 | DATA

Data used in this article were collected by the Lilongwe University of Agriculture and Natural Resources (LUANAR) through the Center for Agricultural Research and Development (CARD) in collaboration with the International Maize and Wheat Improvement Center (CIMMYT) and Purdue University. Four districts were purposively sampled based on high levels of land rental market participation in 2009/2010 according to the nationally representative third Integrated Household Survey (IHS3) data. These districts were as follows: Lilongwe, Salima, and Nkhotakota in the Central region and Zomba in the Southern region. Nkhotakota and Salima were selected to represent rural areas, whereas Lilongwe and Zomba were selected to represent peri-urban areas. The total target sample size was 600, representing 150 farm households per sampled district. In each sampled district, the District Agricultural Development Officer (DADO) was the entry point for the survey team. The DADOs' local knowledge was used to identify Extension Planning Areas (EPA) with high rental market activities within each district.[13] Within each of these EPAs, we used a simple random sampling procedure to select villages for our sample, and chose one village per EPA.

Once a village was selected, the field supervisors, along with the local extension officer, undertook a targeted household listing exercise. Smallholder farm households participating in land renting were identified through a Focus Group Discussion (FGD) with the Village Headman, Lead Farmers, and members of both Village Development Committee (VDC) and members of the Vulnerability Assessment Committee (VAC). These were taken as key individuals that are conversant with the history of the village and land issues including land renting in the sampled village. On average, the FGD comprised about 10 individuals of which 50% were women and community level issues regarding landownership, land availability and use, drivers of land renting, and prevailing farm gate prices of cash crops were discussed.[14] At the end of each FGD, we then randomly sampled individual farming households from the village list of all households.[15] The list served as a sampling frame for our survey. Households involved in renting in land (tenants) or renting out land (landlord), and those that neither rent in nor rent out land (autarkic) during the 2015/2016 season were sampled for the interviews. Each sampled landlord was matched to his or her tenant pair during interview. Thus, if a tenant household was sampled, its corresponding landlord was automatically sampled for the interview and vice versa.[16] This process was repeated until a sample size of 10 matched pairs was reached (i.e., 20 households) in each village. Furthermore, 10 autarkic households in each village were randomly selected from the list as control households. Thus, a

[11] A small percentage (<5%) of tenants (landlords) also rent out (rent in) a small amount of land.

[12] One may wonder why land rental prices are not included in our empirical specifications. Although we have information on rental prices, we do not include them in the model for the following reasons. First, rental price is the same for the tenant and landlord pair so drops out during within-pair FE estimation. Second, rental price is missing for autarkic households who are included in the Tobit models. To include a rental price for these households, we would have to include a village median, which would likely lead to multi-collinearity given the fact that we collect data in only four districts.

[13] An EPA is a group of villages overseen by one extension officer.

[14] Using key informants to help identify respondents to answer questions about sensitive land-related issues have been used in many previous studies including Macours, de Janvry, and Sadoulet (2010), Macours (2014), Vranken, Macours, Nivelin, and Swinnen (2011) and Bardhan and Mookherjee (2010).

[15] Village lists in Malawi are regarded as being accurate because they are used to determine how many input subsidy vouchers are given to a particular community. Therefore, households have incentives to make sure they are included on the list.

[16] Tenants and landlords form unique pairs in this analysis. If at tenant (landlord) had multiple landlords (tenants), then only the landlord (tenant) who owned (operated) the largest rented plot was found for interview. This was done for logistical purposes to keep the time and duration of the survey manageable. It is possible that we may have missed some important relationships by making this decision. However, we are not concerned about biased results arising from only selecting the largest rental partner in terms of land for two reasons. First, there is no reason a priori to assume that the second, or third, rental partner would have different characteristics on average than the first partner. Second, in our matched sample, 80% of landlords had one tenant, whereas 63% of tenants had one landlord. Therefore, we are capturing the most but not all of these transactions. Understanding the structural factors behind why 37% of tenants rent from multiple landlords could be a topic for future research.

total of 30 households were sampled per village. We attempted to track any member of the tenant–landlord pair who resided outside the village, although most pairs ended up being local. Nevertheless, we oversampled, especially in larger villages, to account for nonresponses and both tenant and landlord absenteeism. In each district, five villages were selected with 30 farming households per village adding up to 150 households in five villages at the district level.[17]

Upon cleaning the data and identifying rental partners, we have a sample of 173 tenants and 173 landlords who can be matched with their pair. In addition, we have 187 autarkic households who can be identified in the same communities for a total sample size of 533 unique households.

6 | RESULTS

Table 1 presents means for key indicators among the 173 tenants, their 173 landlords, and 187 autarkic households who live in the same communities. The first row of Table 1 shows that prerental landholding is about 1 ha greater on average for landlords than it is for tenants, at 1.854 versus 0.844 ha, respectively, while cultivated area is larger for tenants on average than it is for their landlords, at 1.713 ha versus 0.961 hectares, respectively. These numbers provide some prima facie evidence that land rental markets transfer land from land-rich to land-poor households. Similarly, the demographic section of Table 1 indicates that on average tenants have larger families than landlords (5.462 vs. 4.988 members), with more adult equivalents (4.531 vs. 4.128) indicating more mouths to feed. At the same time, tenant households have a lower average dependency ratio than their landlords (1.033 vs. 1.297), which means that tenants have more working age adults supporting few children and elderly. These descriptive demographic variables provide some cursory evidence that land rental markets promote the transfer of land from labor-poor landlords to labor-rich tenant households.

However, Table 1 also shows that tenants have a much higher average value of total assets, including both livestock and durables, than their landlords (USD 748 to USD 119). Tenants are more likely to have received credit than landlords in the past year (38.7% vs. 29.5%) and are less likely to work casual labor on another farm (27.7% vs. 58.4%). This form of employment, called *ganyu* labor, is generally considered to be an income source of last resort in Malawi (Alwang & Siegel, 1999). These numbers provide descriptive evidence that tenants are wealthier than their landlords on average, on all dimensions other than landholding.

Table 2 presents the descriptive statistics for questions that were asked to both tenants and landlords about the rented subplots and the nature of their relationship with their rental partner. Responses are very similar between tenants and landlords for questions that relate to statements of facts. For example, both agree that most rental partners are of the same ethnicity (86% and 82%) and live in the same community (77% and 78%). In addition, very few rental contracts are written (9% and 5%). These findings are consistent with previous literature and the notion that in places where tenure is insecure people rent to those with whom they have closer social ties (Macours, 2014). Conversely, we find some very interesting differences between tenants and landlords in their responses to questions about future plans in Table 2. For example, tenants say that they plan to continue renting land for an average of 4.93 seasons beyond the current one (median is 4 seasons), whereas landlords say that they plan to only continue renting out their land for an average of 0.94 seasons beyond the current one (median is 0 seasons). In addition, 65% of tenants say that they plan to purchase the rented plot in the future, whereas only 5% of landlords say that they plan to sell the land that they currently rent out. These findings are consistent with the notion that landlords are renting out their land on what they hope will be a short-term basis in order to realize short-term gains (i.e., features of "stress renting").

Reasons for engaging in land rental are given by tenants and landlords in Table 3. By far, the main reason why landlords rent out their land is due to the need for cash (75%), followed by 17% of landlords who say that they rent out the subplot because they lack the labor to cultivate it. Only 2% of landlords say that they rent out land in order to engage in more profitable activities. This suggests that money earned from renting out land goes to fulfill immediate consumption needs rather than investment. Furthermore, Table 1 indicated that landlords have much lower income from nonfarm activities than tenants, suggesting that landlords do not take the money from renting out and invest in other profitable activities outside agriculture. Both the finding of renting out to meet immediate consumption needs and lack of nonfarm income by landlords have been noted for Malawi (and Zambia) by Chamberlin and Ricker-Gilbert (2016) and are consistent with the notion of "stress renting" by landlords. Conversely, Table 3

[17] Given that land issues are very sensitive in Malawi, several challenges were encountered during sampling. It was noted that there were fears for people to come out openly that they are involved in land renting. Some were afraid if they disclosed their activities, they would risk losing their land to the government as they would be assumed to have more land then they needed to cultivate for themselves. Another challenge was that, at the time of the survey, a new Land Act was being debated and passed by the Malawian Parliament, as mentioned earlier. As a result, some tenants who were renting in the land were afraid that the survey teams were sent by their landlords to follow up on them. For example, we found instances in Zomba and Salima where potential respondents would decline to be interviewed. We addressed the concerns by respondents by making proper introductions to the project and assuring them that their participation was voluntary and confidential. In addition, in some villages it was not possible to identify 30 candidate households. In such situations, households were sampled at Group Village Headman level (a cluster of several villages under the leadership of one chief), in order to maintain five villages sampled per district.

TABLE 1 Averages for key variables by rental market status

Variable category	Variable	Tenants	Landlords	Autarkic
Land	Prerental landholding in hectare	0.844	1.854	1.278
	Cultivated area in hectare	1.713	0.961	1.160
social connections	Chief's relative (0, 1)	0.445	0.595	0.610
	Village government (0, 1)	0.052	0.058	0.043
	Received FISP coupon	0.416	0.543	0.513
Input purchases	Kilograms commercial fertilizer purchased	169	30	79
	Kilograms of commercial maize seed purchased	10	4	4
Savings and assets	Household savings in USD	83	10	40
	Household needed credit (0, 1)	0.584	0.520	0.556
	Household received credit (0, 1)	0.387	0.295	0.326
	Total livestock value USD	276	80	160
	Total value durables USD	472	39	74
	Total value all assets USD	748	119	234
	Value of houses USD	1,386	1,074	2,568
Demographics	Number of family members	5.462	4.988	5.086
	Female headed household (0, 1)	0.104	0.260	0.299
	Head is a migrant (0, 1)	0.497	0.301	0.278
	Head age	40.439	47.231	49.428
	Head years schooling	7.775	4.751	5.139
	Adult equivalents	4.531	4.128	4.225
	Dependency ratio	1.033	1.297	1.212
Revenue sources	Member works as casual laborer on other farm	0.277	0.584	0.428
	Member works as casual laborer off farm	0.179	0.254	0.182
	Total income earned USD	836	276	439
	Total income from casual work USD	71	41	141
	Total income from nonfarm work USD	445	83	140
Scales	Grit score[a]	30.34	28.65	29.81
	Present bias[b]	55,477	39,725	45,535
	Risk preferences[c]	162,875	213,979	75,305

Note. $N = 533$: 173 tenants, 173 landlords, and 187 autarkic.

[a]Scale from 8 to 40; higher score = more grit and higher ability.

[b]Higher score = less present bias.

[c]Lower score = less risk averse.

indicates that tenants rent in land as an initial pathway into farming (74%) and to expand the area that they operate (17%). This suggests that tenants view farming as a gateway to a better livelihood and as an opportunity to increase their income and food security.

Table 4 presents the regression results for factors affecting the amount of area rented in by households (where landlords [other than the less than 5% who also rent in some land] and autarkic households have zero-valued outcomes). The models estimated in columns (1)–(6) follow our main identification strategy, pairwise FE, where only the 173 tenant–landlord pairs are included in the analysis. For robustness, columns (7)–(12) are estimated via Tobit (as has been done in the previous literature) and include the 187 autarkic households in the dataset along with the 173 tenant–landlord pairs. Overall results are similar between the pairwise FE and Tobit estimators. Education is positively associated with more land rented in across all specifications, and statistically significant in all specifications except for column (6). The grit score is also positively associated with renting in more land but is only significant in the parsimonious specifications in columns (2) and (8). The positive coefficients on education and grit score provide support for the notion that land rental markets promote efficiency by transferring land to more educated households with more grit than other households.

Prerental landholding has a negative and statistically significant coefficient across specifications in Table 4. According to the previous literature (Holden et al., 2009), this indicates that land rental markets transfer land from land-rich households to land-poor households, ceteris paribus. In addition, the

TABLE 2 Rental market comparisons by market participation status

	Response by tenant	Response by landlord
Rental agreement is fixed rent or borrowed (%)	98	95
Rental partner is blood relative or in-law (%)	22	21
Rental partner same ethnicity (%)	86	82
Rental partner lives in same community (%)	77	78
Rental partner's main occupation is farming (%)	85	65
Number of times during the past 5 years you have rented this subplot (mean)	154	166
Number of times during the past 5 years you have rented this subplot (median)	119	100
Number of years with the current rental arrangement (mean)	123	115
Number of years with the current rental arrangement (median)	100	100
Have a written rental agreement with partner (%)	9	5
Number of years that you plan to continue in this arrangement (mean)	493	94
Number of years that you plan to continue in this arrangement (median)	400	0
Plan to eventually buy (sell) this rented in (out) subplot (%)	65	5

Note. 169 out of 173 matched landlords, and 161 out of 173 matched tenants answered these questions.

TABLE 3 Main reason for engaging in rental market by rental status

	Tenant (%)		Landlord (%)
Acquire land for farming	74	Needed cash	75
Expand the area that I farm	17	Did not have enough labor to cultivate	17
Expand land for investment	2	More profitable to rent out than cultivate	4
Acquire land for investment	2	Engaged in other more profitable activities	2
Other	5	Not interested in farming subplot	2

Note. 169 out of 173 matched landlords, and 161 out of 173 matched tenants answered this question.

coefficient estimates on number of household members are also positive across specifications, and statistically significant across specifications other than columns (6) and (12). The previous literature also suggests that land rental markets promote the transfer of land from labor-poor to labor-rich households, ceteris paribus. Our results on the renting-in side suggest that land rental markets are a pathway for land expansion for those who ex ante have little land and surplus labor. However, our balanced sample allows us to see if these results hold on the renting-out side in subsequent tables. We also see in columns (6) and (12) that households with more assets are significantly more likely to rent in land. This provides support for the descriptive results, which suggest that tenants are wealthier than landlords across all dimensions other than landholdings. It is also consistent with the notion that wealth and cash at planting are needed to rent in land.

Table 5 presents the factors affecting the area rented in, estimated via DH, using a similar set of specifications. The first stage results, showing the decision to participate in land rental markets, estimated via probit, are remarkably similar to the estimation results from the pairwise FE and Tobit models in Table 4. The results in columns (1)–(6) show positive and significant coefficients on education and grit, which further support for notion that land rental markets promote efficiency. Smaller prerental landholding and larger labor endowments are positively associated with rental market participation, suggesting land–labor equalization effects. However, the coefficient on assets in both first and second stages suggests net transfers to wealthier farmers, as in the previous models. Most of the significant factors affecting renting in land are found in the participant hurdle 1, rather than the extent to renting in shown in hurdle 2.

Table 6 focuses on the landlord side of the market by presenting the results for factors affecting the amount of area rented out by households in hectares. Table 6 is presented in the same way as Table 4. There is some evidence in column (2) of the pair FE results, and in columns (7), (8), (11), and (12) of the Tobit results that households with less education and less grit are more likely to rent out their land. The coefficient estimates on prerental landholding are positive and statistically significant across specifications, indicating that households with more land ex ante are more likely to rent out their land. In addition, the coefficient estimate on number of family members is statistically significant and negative across specifications other than column (12) suggesting that households with less labor are more likely to rent out their land, ceteris paribus. These findings are consistent with our findings on the rented-in side of the market shown in Table 4. They also build

TABLE 4 Factors affecting area rented in, pair fixed effects (FE) and Tobit estimates

Dependent variable = area rented in (ha)	Pair FE estimator (1)–(6)						Tobit estimator (7)–(12)					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Education of HH head	0.06***				0.06***	0.02	0.05***				0.04***	0.01**
	(.000)				(.001)	(.212)	(.000)				(.000)	(.024)
Grit score		0.02***			0.01	–0.02		0.01***			0.01	–0.002
		(.009)			(.336)	(.115)		(.009)			(.222)	(.600)
Present bias			0.00		0.00	–0.00			0.00		0.00	0.00
			(.262)		(.787)	(.549)			(.378)		(.898)	(.571)
Risk aversion				–0.00	0.00	0.00				0.00	–0.00	–0.00
				(.835)	(.807)	(.780)				(.798)	(.956)	(.889)
Prerental landholding in hectare	–0.23***	–0.26***	–0.27***	–0.27***	–0.23***	–0.18***	–0.11***	–0.12***	–0.12***	–0.12***	–0.11***	–0.11***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.001)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Number of HH members	0.09***	0.11***	0.11***	0.11***	0.09***	0.04	0.04***	0.05***	0.05***	0.05***	0.04***	0.02
	(.004)	(.002)	(.002)	(.002)	(.009)	(.168)	(.000)	(.000)	(.000)	(.000)	(.000)	(.113)
=1 if HH head is female						0.04						–0.06
						(.828)						(.415)
=1 if migrant HH head						0.31**						0.19***
						(.013)						(.000)
Age of household head*10						–0.06						–0.08***
						(.181)						(.000)
IHS of savings in USD						0.05						0.02
						(.216)						(.110)
IHS of value of assets in USD						0.18***						0.13***
						(.000)						(.000)
Number of observations	346	346	346	346	346	346	533	533	533	533	533	533
R^2	.26	.19	.18	.17	.26	.39	.09	.04	.04	.03	.09	.20
Number of matched pairs	173	173	173	173	173	173	–	–	–	–	–	–

Note. Dependent variable is the amount of land rented in, measured in hectares. Landlords have zero-valued outcomes in all models, expect for the less than 5% of landlords who also rent in a small amount of land. Autarkic households are not included in the pair FE models, but are included in the Tobit model (in which they have zero-valued outcomes). *, **, and *** indicate that the corresponding means are different from each other at the 10%, 5%, and 1% level, respectively; *p*-values in parentheses. Tobit estimates include district dummies but pair FE estimates do not; coefficient estimates from Tobit estimator are average partial effects. Standard errors in pair FE and double hurdle clustered at matched pair level. IHS stands for inverse hyperbolic sine transformation. It is interesting to note that the coefficient estimate for number of household members loses statistical significance in columns 6 and 12 when other factors such as value of assets are added to the model. This is likely due to multi-collinearity as the correlation between number of family members and value of assets is 0.275. Multi-collinearity affects statistical significance but does not bias coefficient estimates.

TABLE 5 Factors affecting area rented in, double hurdle (DH) estimates

	Hurdle 1: participation in land renting, (probit estimator). Dependent variable = 1 if household rents in land						Hurdle 2: extent of area rented in (truncated normal estimator). Dependent variable = area rented in (ha)				Overall DH estimates (Hurdles 1 and 2)
Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**	**(11)**
Education of HH head	0.04***				0.03***	0.01**	1.57			0.19	0.017**
	(.000)				(.000)	(.015)	(.653)			(.325)	(.045)
Grit score		0.01***			0.00	–0.00		0.53		–0.07	–0.004
		(.005)			(.221)	(.701)		(.852)		(.464)	(.451)
Present bias			0.00		0.00	0.00			0.00	0.00	0.000
			(.263)		(.748)	(.136)			(.817)	(.845)	(.799)
Risk aversion				0.00	0.00	0.00				–0.00	0.000
				(.517)	(.371)	(.112)				(.141)	(.136)
Prerental landholding in hectare	–0.13***	–0.13***	–0.13***	–0.13***	–0.13***	–0.13***	5.92	11.99	11.38	0.67	–0.073
	(.000)	(.000)	(.001)	(.000)	(.000)	(.000)	(.624)	(.789)	(.782)	(.245)	(.115)
Number of HH members	0.03***	0.03***	0.03***	0.03***	0.03***	0.01	1.83	3.15	2.87	0.08	0.011
	(.001)	(.000)	(.000)	(.000)	(.001)	(.210)	(.655)	(.802)	(.794)	(.762)	(.439)
=1 if HH head is female						–0.03				–2.32	–0.117
						(.481)				(.467)	(.317)
=1 if migrant HH head						0.12***				3.42*	0.222***
						(.001)				(.081)	(.000)
Age of household head*10						–0.05***				–0.09	–0.007***
						(.000)				(.113)	(.004)
IHS of savings in USD						0.01				0.10	0.014
						(.126)				(.705)	(.242)
IHS of value of assets in USD						0.09***				1.53**	0.126***
						(.000)				(.047)	(.000)
Observations	533	533	533	533	533	533	178	178	178	178	533
R^2	.17	.09	.09	.08	.17	.32	.04	.01	.01	.08	.15

Note. Dependent variable is the amount of land rented in, measured in hectares. Landlords have zero-valued outcomes in all models, expect for the less than 5% of landlords who also rent in a small amount of land. Autarkic households are not included in the pair FE models, but are included in the Tobit model (in which they have zero-valued outcomes). *, **, and *** indicate that the corresponding means are different from each other at the 10%, 5%, and 1% level, respectively; *p*-values in parentheses. Estimates include district dummies. Coefficient estimates are average partial effects. IHS stands for inverse hyperbolic sine transformations. Standard errors in hurdle 1 are robust to heteroscedasticity. Standard errors in column (11) obtained via bootstrapping at 200 repetitions. Hurdle 2 specifications that include only risk aversion do not converge. R^2 in columns (7)–(11) are squared correlations.

TABLE 6 Factors affecting area rented out

Dependent variable = area rented out (ha)	Pair FE estimator (1)–(6)						Tobit estimator (7)–(12)					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Education of HH head	–0.01				–0.01	0.009	–0.02***				–0.01***	–0.01*
	(.361)				(.531)	(.503)	(.000)				(.003)	(.093)
Grit score		–0.02*			–0.01	–0.01		–0.01***			–0.01***	–0.01*
		(.081)			(.174)	(.654)		(.000)			(.002)	(.079)
Present bias			0.00		0.00	0.00			–0.00		–0.00	–0.00
			(.295)		(.279)	(.261)			(.599)		(.766)	(.888)
Risk aversion				0.00	0.00	0.00				0.00	0.00	0.00
				(.497)	(.475)	(.669)				(.666)	(.755)	(.926)
Prerental landholding in hectare	0.51***	0.52***	0.52***	0.52***	0.51***	0.50***	0.18***	0.18***	0.18***	0.18***	0.18***	0.20***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Number of HH members	–0.09***	–0.10***	–0.10***	–0.10***	–0.09***	–0.07***	–0.02***	–0.03***	–0.03***	–0.03***	–0.02**	–0.01
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.009)	(.005)	(.003)	(.004)	(.012)	(.280)
=1 if HH head is female						0.07						–0.03
						(.508)						(.587)
=1 if migrant HH head						0.06						0.02
						(.560)						(.653)
Age of household head*10						0.04						–0.02
						(.320)						(.216)
IHS of savings in USD						0.02						–0.01
						(.528)						(.617)
IHS of value of assets in USD						–0.11***						–0.07***
						(.002)						(.000)
Number of observations	346	346	346	346	346	346	533	533	533	533	533	533
R^2	.57	.57	.57	.57	.58	.61	.17	.17	.15	.15	.18	.22
Number of matched pairs	173	173	173	173	173	173	–	–	–	–	–	–

Note. Dependent variable is the amount of land rented out, measured in hectares. Tenants have zero valued outcomes in all models, expect for the less than 5% of tenants who also rent out a small amount of land. Autarkic households are not included in the pair FE models but are included in the Tobit model (in which they have zero-valued outcomes). *, **, and *** indicate that the corresponding means are different from each other at the 10%, 5%, and 1% level, respectively; *p*-values in parentheses. Tobit estimates include district dummies but pair FE estimates do not. Coefficient estimates from Tobit estimator are average partial effects. Standard errors in pair FE and double hurdle clustered at matched pair level. IHS stands for inverse hyperbolic sine transformation.

TABLE 7 Factors affecting area rented out, double hurdle (DH) estimates

Dependent variable = area rented out (ha)	Hurdle 1: participation in land renting, (probit estimator). Dependent variable = 1 if household rents out land						Hurdle 2: extent of area rented in (truncated normal estimator). Dependent variable = area rented out (ha)						Overall DH estimates (hurdles 1 and 2)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Education of HH head	–0.02***				–0.02***	–0.01*	–0.01				0.01	0.01	–0.004
	(.000)				(.000)	(.081)	(.824)				(.828)	(.872)	(.415)
Grit score		–0.01***			–0.01***	–0.01*		–0.05			–0.05	–0.05	–0.007*
		(.000)			(.005)	(.095)		(.114)			(.127)	(.163)	(.052)
Present bias			–0.00		–0.00	–0.00			0.00		0.00	0.00	0.000
			(.150)		(.220)	(.268)			(.132)		(.124)	(.123)	(.970)
Risk aversion				0.00	0.00	0.00				–0.00	–0.00	0.00	0.000
				(.301)	(.184)	(.344)				(.857)	(.945)	(.861)	(.929)
Prerental landholding in hectare	0.11***	0.11***	0.11***	0.11***	0.11***	0.13***	1.01***	1.00***	0.99***	1.01***	0.98***	1.00***	0.162***
	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
Number of HH members	–0.02**	–0.02**	–0.02**	–0.02**	–0.02*	–0.01	–0.13**	–0.13**	–0.12**	–0.13**	–0.12**	–0.12*	–0.013
	(.040)	(.025)	(.015)	(.025)	(.060)	(.530)	(.042)	(.031)	(.049)	(.036)	(.045)	(.087)	(.127)
=1 if HH head is female						–0.06						0.36	–0.003
						(.220)						(.248)	(.949)
=1 if migrant HH head						0.01						–0.04	0.001
						(.868)						(.909)	(.987)
Age of household head *10						–0.01						–0.00	–0.001
						(.447)						(.838)	(.537)
IHS of savings in USD						–0.01						0.14	0.008
						(.500)						(.123)	(.418)
IHS of value of assets in USD						–0.07***						–0.09	–0.050***
						(.000)						(.442)	(.001)
Observations	533	533	533	533	533	533	170	170	170	170	170	170	533
R^2	.10	.09	.08	.07	.11	.17	.32	.34	.32	.33	.33	.34	.27

Note. Dependent variable is the amount of land rented out, measured in hectares. Tenants have zero valued outcomes in all models, expect for the less than 5% of tenants who also rent out a small amount of land. Autarkic households are not included in the pair FE models, but are included in the Tobit model (in which they have zero-valued outcomes). *, **, and *** indicate that the corresponding means are different from each other at the 10%, 5%, and 1% level, respectively; *p*-values in parentheses. Estimates include district dummies. Coefficient estimates are average partial effects. IHS stands for inverse hyperbolic sine transformations. Standard errors in hurdle 1 are robust to heteroscedasticity. Standard errors in column (13) obtained via bootstrapping at 200 repetitions. R^2 in columns (7)–(13) are squared correlations.

upon the previous literature by showing the impacts of renting out land on a balanced sample of landlords. In total, our results from both sides of the market confirm that land renting in Malawi facilitates the transfer of land from land-rich to land-poor households ex ante, and from labor-poor to labor-rich households. Also, consistent with the results presented in Table 4, the coefficient on value of household assets is negative and statistically significant in columns (6) and (12). This provides further indication that households with fewer nonland assets are more likely to rent out their land than other households.

Table 7 presents the factors affecting area rented out using the DH estimates. Here, again, first stage DH results are very consistent with results from the FE and Tobit models shown in Table 6. Education and grit are negatively associated with the renting-out decision, suggesting net transfer of land away from less educated households and from households with less grit. The negative coefficient on value of assets (in both first and second stages) further supports the idea that poorer farmers are more likely to participate in markets as landlords. As in Table 5, most of the story in the land renting-out decision is made in the first stage participation hurdle, rather than the second stage extent of area rented-out hurdle.

7 | CONCLUSIONS

This article presents new information on rural land rental market participation and their impacts on smallholder farm households in Malawi. A novel feature of our study is the use of a paired landlord–tenant survey, which fully captures the landlord side of the rental market, a key shortcoming of most earlier empirical studies in sub-Saharan Africa. This matched sample structure also allows us to use rental pair FE to control for unobservable characteristics of tenant–landlord pairs that may otherwise bias model estimation. We find evidence that most tenant–landlord pairs in our matched sample live in the same community and are of the same ethnicity. This suggests that the reasons for landlord under reporting in LSMS and other datasets is not due to urban-based landlords being absent from sampling frames, but more likely due to (a) respondents being reluctant to acknowledge renting out land and/or (b) enumerators not successfully probing about the ownership of rented out plots. Our results do not indicate the prevalence of absentee landlords, for example, urban-based individuals who have acquired rural land and rent it out to residents. However, it is important to recognize that indigenous "land grabs" by urban-based investors could be occurring, but are underrepresented in surveys that use population-based sampling frames such as ours, the LSMS-ISA surveys, and others. This is because absentee landowners likely make up a relatively small proportion of the population, and they are likely not on village lists used for sampling frames. A land-based survey would be needed to capture this phenomenon.

Our results demonstrate that rental markets do tend to transfer land from land-rich to land-poor households, and from labor-poor to labor-rich households, thus facilitating the transfer of land in SSA. These results are consistent with previous literature on the topic that refers to these transfers as being equity enhancing (Chamberlin & Ricker-Gilbert, 2016; Holden et al., 2009; Jin & Jayne, 2013). However, our matched sample also indicates that the story about land rental markets in this context is not unequivocally positive; tenants are wealthier than their landlords in most observable dimensions, such as savings, value of assets, and access to credit. Furthermore, most landlords in our sample are resource constrained and rent out land in order to satisfy short-term liquidity constraints, features that align with a "stress rental" hypothesis (Chamberlin & Ricker-Gilbert, 2016; Gebregziabher & Holden, 2011). Our findings on the landlord side of the market raises questions about whether these gains should really be thought of as equity enhancing from a broader perspective. In addition, the factors determining why in an agrarian society like in rural Malawi, households with more land are poorer than those with less land are an important avenue for further empirical research.

Our double-hurdle model estimates suggest that most of the significant factors affecting renting in land are found in the participant hurdle 1, rather than the extent to renting in shown in hurdle 2. This suggests that most of the barriers to entry in land rental markets and most of the considerations made by households occur at the participant stage. It also makes sense, as the amount of land that is rented on average in Malawi is very small.

Our article has also shown evidence in support of production efficiency gains through land rental markets, as tenants show lower levels of risk aversion, lower present bias, and higher levels of "grit"—all of which signal characteristics of farmers who are more likely to make productivity-enhancing investments. This aligns with policy objectives for the smallholder sector and, on the face of it, is a virtuous impact of rental market development on the structural transformation process in rural SSA. However, the concern about "stress renting" where landlord households are willing to part with their most important asset (land) to meet consumption needs rather than renting out land to earn cash that they use to engage in other more remunerative employment or investment opportunities calls into question whether or not land rental markets in this context actually contribute toward structural transformation. Given tenants' short-term investment orientation, this may contribute to nutrient mining and depletion of land productivity over the longer term (e.g., see Jacoby and Mansuri (2008) and Ali, Abdulai, and Goetz (2012) for empirical evidence of nutrient mining on rented in vs. owner-cultivated land in Pakistan). If poor landlords had access to more

investment capital, it appears likely that they would reap greater benefits from cultivation, as opposed to renting out, when considered over the longer term. More research on the magnitude of the foregone benefits would help clarify policy options.

ACKNOWLEDGMENTS

The authors acknowledge funding for this research from the Bill and Melinda Gates Foundation under the Guiding Investments in Sustainable Agricultural Intensification in Africa project led by Michigan State University. The authors are grateful to Sebastian Anti, along with seminar participants at the University of Illinois, Virginia Tech, North Carolina State University, and the 2017 Agricultural and Applied Economics Association annual meeting for helpful feedback. We also thank the Agricultural Economics editor, Ashok Mishra, and three anonymous referees for insightful comments that greatly improved our manuscript. All remaining errors belong to the authors.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

How to cite this article: Ricker-Gilbert J, Chamberlin J, Kanyamuka J, Jumbe CBL, Lunduka R, Kaiyatsa S. How do Informal farmland rental markets affect smallholders' well-being? Evidence from a matched tenant–landlord survey in Malawi. *Agricultural Economics*. 2019;50:595–613. https://doi.org/10.1111/agec.12512

APPENDIX A: GRIT SCALE

I. New ideas and projects sometimes distract me from previous ones.
1) Very much like me
2) Mostly like me
3) Somewhat like me
4) Not much like me
5) Not like me at all

II. Setbacks don't discourage me.
1) Very much like me
2) Mostly like me
3) Somewhat like me
4) Not much like me
5) Not like me at all

III. I have been obsessed with a certain idea or project for a short time but later lost interest.
1) Very much like me
2) Mostly like me
3) Somewhat like me
4) Not much like me
5) Not like me at all

IV. I am a hard worker
1) Very much like me
2) Mostly like me
3) Somewhat like me
4) Not much like me
5) Not like me at all

V. I often set a goal but later choose to pursue a different one.
1) Very much like me
2) Mostly like me
3) Somewhat like me
4) Not much like me
5) Not like me at all

VI. I have difficulty maintaining my focus on projects that take more than a few months to complete.
1) Very much like me
2) Mostly like me
3) Somewhat like me
4) Not much like me
5) Not like me at all

VII. I finish whatever I begin.
1) Very much like me
2) Mostly like me
3) Somewhat like me
4) Not much like me
5) Not like me at all

VIII. I am diligent
1) Very much like me
2) Mostly like me
3) Somewhat like me
4) Not much like me
5) Not like me at all

Note. Statements with positive connotations are scored in reverse (e.g., more points given if statement describes the person).

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APPENDIX B: RISK AVERSION QUESTIONS

1. Do you prefer a gift of MK 20,000, or participating in a lottery that gives you 50% chance to win MK 40,000 and 50% chance to win nothing?	Gift of MK 20,000	A
	Lottery for MK 40,000	B
2. Do you prefer a gift of MK 20,000, or participating in a lottery that gives you 50% chance to win MK 50,000 and 50% chance to win nothing?	Gift of MK 20,000	A
	Lottery for MK 50,000	B
3. Do you prefer a gift of MK 20,000, or participating in a lottery that gives you 50% chance to win MK 60,000 and 50% chance to win nothing?	Gift of MK 20,000	A
	Lottery for MK 60,000	B
4. Do you prefer a gift of MK 20,000, or participating in a lottery that gives you 50% chance to win MK 70,000 and 50% chance to win nothing?	Gift of Q200	A
	Lottery for Q 70,000	B
IF ANSWER IS (A) TO 1 AND 2 AND 3 AND 4, ASK:	MK	
5. How much would you have to be paid to choose the lottery?		

Note. MK stands for Malawi Kwacha. USD 1.00 ≈ 700 MK during survey.

APPENDIX C: PRESENT BIAS QUESTIONS

Do you prefer a MK 10,000 prize guaranteed today or a MK 12,500 prize guaranteed 3 months from now?	MK 10,000 today	A
	MK 12,500 in 3 months	B
Do you prefer a MK 10,000 prize guaranteed today or a MK 15,000 prize guaranteed 3 months from now?	MK 10,000 today	A
	MK 15,000 in 3 months	B
Do you prefer a MK 10,000 prize guaranteed today or a MK 17,500 prize guaranteed 3 months from now?	MK 10,000 today	A
	MK 17,500 in 3 months	B
Do you prefer a MK 10,000 prize guaranteed today or a MK 20,000 prize guaranteed 3 months from now?	MK 10,000 today	A
	MK 20,000 in 3 months	B
IF ANSWER IS (A) TO 1 AND 2 AND 3 AND 4, ASK:	MK	
How much would the prize have to be for you to choose to wait?		

Note. MK stands for Malawi Kwacha. USD 1.00 ≈ 700 MK during survey.