

# Gender-Differentiated Impacts of Tenure Insecurity on Agricultural Performance in Malawi's Customary Tenure Systems

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## Abstract

Many African countries rely on sporadic land transfers from customary to statutory domains to attract investment and improve agricultural performance. Data from 15,000 smallholders and 800 estates in Malawi allow exploring the long-term effects of such a strategy. The results suggest that (i) most estates are less productive than smallholders; (ii)

fear of land loss, although not exclusively due to estates, is associated with a 12 percent productivity loss for females, which is large enough to finance a low-cost tenure regularization program; and (iii) failure to collect realistic land rents implies public revenue losses of up to US\$50 million per year.

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# **Gender-Differentiated Impacts of Tenure Insecurity on Agricultural Performance in Malawi's Customary Tenure Systems**

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## **Gender-differentiated impacts of tenure insecurity on agricultural performance in Malawi's customary tenure systems**

### **1. Introduction**

In most African countries, land access continues to be governed by customary tenure systems. These have long been argued to provide high levels of tenure security and flexibility at a cost well below that of ‘modern’ arrangements (Bruce and Migot-Adholla 1994). Yet, studies also highlight that, with population pressure, these systems face increasing pressure: Unclear rules on how to deal with outsiders –whether migrants or foreign investors– can trigger disputes, undermining investment (Berry 2009; Fenske 2010) and productivity (Linkow 2016). Bias against women may further compromise tenure security and productive resource use (Fenske 2011; Goldstein and Udry 2006), with women more likely to be affected by disputes and to suffer productivity losses than men (Deininger and Castagnini 2006). Unclear institutional responsibilities may lead to proliferation and persistence of conflict (Eck 2014). To respond to this challenge, countries aim to either comprehensively formalize tenure or to carve out land deemed to be unutilized from customary arrangements sporadically. Yet, the limited sustainability of past efforts at systematic formalization is well documented (Atwood 1990; Pinckney and Kimuyu 1994) and although more recent efforts imply that lower-cost approaches may provide a viable option (Ali *et al.* 2014a), the verdict on their sustainability is still out (Ali *et al.* 2016a). Yet, the alternative of carving out land from the customary domain for ‘commercial’ development on a case by case basis raises equity and productivity issues (Sitko *et al.* 2014).

To contribute to this discussion, this paper assesses estates’ impact on productivity and neighbors’ tenure security decades after their establishment in Malawi, a country that underwent a burst of estate creation in the 1980s and is thus ideal for such an exploration. We use the 2006/07 National Census of Agriculture and Livestock (NACAL) that contains data on smallholders and estates for descriptive and analytical evidence. Descriptively, we find that, although estates occupy more than 20% of Malawi’s agricultural area, a large part of their land is left unutilized and, for most crops, their productivity remains well below that of smallholders. Data from digitizing estate leases suggest that legal uncertainty created by the expiration of most leases and failure to collect realistic lease fees lead to large loss of public revenue, beyond weakening incentives for more effective land use and land market operation: Even assuming that 40% of the area registered under agricultural estates is non-existent or unsuitable for agriculture, leasing the remainder at

the median rent of US\$53/ha & year that, as per the last household survey, smallholders are willing to pay,<sup>1</sup> could generate annual income of some US\$50 million, equivalent to almost 5% of Malawi's public revenue.

Beyond failing to live up to expectations in terms of productive development, estate development also does not seem to have reduced tenure insecurity: with 22% of farmers concerned about losing their land and 21% fearing encroachment, tenure insecurity is high. It is particularly pronounced among the poor, households not born in the village or engaged in land transactions or who had a land dispute in the past, and in villages close to an estate with no more land to be distributed. By comparison, impacts of matrilineal inheritance, a factor emphasized in the recent literature, seem modest at best. Including fear of land loss in a production function suggests that insecure tenure is associated with a 12% point output reduction for women but not for men. In principle, comparing the present value of productivity gains due to program-induced reductions in tenure insecurity to program costs would allow to decide if systematic regularization can economically justify an alternative to demand-driven estate development. This implies that if a tenure regularization program as implemented in Rwanda at a cost of US\$5 to US\$6 per parcel (Nkurunziza 2015) could eliminate insecurity in Malawi, its benefits would be more than sufficient to recoup the costs. Carefully designed and evaluated pilots that pay particular attention to women's rights and overlap with estate leases could help not only to deal with the issue of estate lease renewal, but also inform implementation of recently adopted Land Bills. If success can be demonstrated and regulations to implement at larger scale passed, they could provide significant economic benefits.

The remainder of the paper is organized as follows. Section two puts Malawi's land tenure system in context by describing its evolution, highlighting questions to be analyzed, and drawing out their relevance for recent debates on land legislation. Section three presents the sample and descriptive evidence on smallholders' and estates' intensity of land use and productivity and the size and potential lease fees from estates. Section four discusses econometric results on determinants and productivity impacts of perceived tenure insecurity by male and female users. Section five concludes by drawing out implications for policy and future research.

## **2. Context, issues, and link to the literature**

While dating back to colonial times, Malawi's dualistic agrarian structure was reinforced by the creation of estates on more than 20% of the country's area in the late 1980s and limitations on smallholders' market participation. While the latter were eased in the 1990s, debates on land tenure remained inconclusive and opinions on next steps remained divided. Quantitative evidence can help put issues in perspective and point

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<sup>1</sup> Data are from the 2010/11 Third Integrated Household Survey ([IHS3](#)). We chose willingness to pay because it is slightly lower than the median rent paid (US \$55/ha and year) and because it is based on responses from close to 90% of the sample rather than only those participating in markets.

out challenges to be confronted. This is particularly relevant to be aware of the challenges to be confronted in implementing the recently passed land Bills.

## **2.1 The evolution of Malawi's agrarian structure and land tenure system**

Malawi has a dualistic farm structure that juxtaposes freehold or leasehold estates focused on 'commercial' activity with a customary sector emphasizing food crops. With 177 persons per km<sup>2</sup> in 2014, population density is high. During colonial times, cultivation of tobacco, the country's main cash and export crop, was restricted to white settlers who had preferential access to land, labor, and credit (Binswanger *et al.* 1995), and guaranteed market access via a quota system (Mataya and Tsonga 2001). After independence in 1964, estate land was transferred to Malawians (Jaffee 2003) with direct and indirect public support:<sup>2</sup> Until 1994, only estates were allowed to produce tobacco and smallholders had to sell output to the marketing board at low prices. The surplus thus generated was funneled to estate owners in the form of soft loans, thus providing an implicit subsidy that reinforced the dualistic structure of the country's agriculture (Kydd and Christiansen 1982). Thereafter, tobacco quotas were gradually extended to smallholders by licensing clubs of 10-30 members. Rapid take-up led to marked improvements in socio-economic indicators (Jaffee 2003) and soon brought small farmers' share in tobacco production to some 70% (Lea and Hanmer 2009).

Although debated since the mid-1990s, no corresponding changes were made in the country's land system. To accommodate pent-up demand for land to cultivate commercial crops, 30,000 to 50,000 estates of 10-30 hectares each were carved out of what was deemed unutilized customary land and transferred to aspiring farmers in the late 1980s, largely via 21-year leaseholds (Devereux 1997),<sup>3</sup> before a 1994 moratorium to stop new estate establishment.<sup>4</sup> With records on paper only, data on the size and performance of the estate sector, including the amount of land leased to estates, total land rent owed to government, and levels of land utilization, remained scant,<sup>5</sup> making it difficult to design policy to fully utilize the sector's potential.<sup>6</sup>

## **2.2 Efforts to improve tenure security**

Malawi's customary sector, long characterized by egalitarian of land access and great diversity between different inheritance systems, has come under strain due to population growth, land scarcity (Ricker-Gilbert *et al.* 2014) and urban expansion that increased prices (Takane 2008). Land transactions with outsiders not

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<sup>2</sup> Transactions were directly supported through loans from the Farmers Marketing Board (FMB), a successor to the Native Tobacco Board, later transformed into the Agricultural Development and Marketing Cooperative (ADMARC). Indirect support came from restricting tobacco cultivation by smallholders and from establishing ADMARC as the sole marketing option with a power to fix prices (Mandondo and German 2015).

<sup>3</sup> As access to a minimum of 12 ha of land was required to access tobacco marketing quotas, an unknown number of so-called 'ghost estates' was established, often in office-based processes without corresponding to actual land on the ground.

<sup>4</sup> Failure to recognize customary rights –reinforced by subsidies that benefit the rich (Chinsinga and Poulton 2014)– was a key reason why even *prima facie* successful expansion of tobacco cultivation may have had mixed socio-economic impacts (Mandondo and German 2015).

<sup>5</sup> A 1997 study that aimed to obtain more precise figures faced difficulties due to the parlous state of records. It estimates that leasehold estates cover less than 1 mn. ha while smallholders on customary land account for the remainder of the country's agricultural area (Gossage 1997).

<sup>6</sup> A resettlement program to partly address this increased beneficiaries' food security but may have jeopardized women's rights (Mueller *et al.* 2014). Little is known about the extent to which this program addressed the issue of 'idle estates' or was the most cost-effective way for doing so.

only became more frequent but were also frequently challenged ex post (van Donge 1999), with a possibility of disputes surfacing even after long periods of dormancy (Jul-Larsen and Mvula 2007). Land tenure reform has long been advocated to improve tenure security, encourage investment and effectiveness of land use (Fenske 2011; Lawry *et al.* 2016) as well as operation of land markets (Ali *et al.* 2014b), and female empowerment (Ali *et al.* 2016b; Newman *et al.* 2015).

To pursue such reform, a Presidential Commission was established in 1996 and submitted a report (Saidi 1999) that prompted adoption of a National Land Policy and implementation strategy in 2002. Draft legislation was submitted to Parliament in 2006 but no action was taken for a decade.<sup>7</sup> Substantive concerns have been raised regarding the Bills' failure to acknowledge complex local realities (Peters and Kambewa 2007), in particular (i) recognition of land rental and sales instead of either outlawing them or making them contingent on Ministerial approval; (ii) potentially adverse gender impacts of registering land in the name of (male) heads and requiring equal inheritance by all children that may conflict with deep-rooted norms (Peters 2010) or, in matrilineal systems, undermine females' bargaining power (Telalagic 2014);<sup>8</sup> and (iii) a danger of local land committees becoming politicized (Chinsinga 2011).

Whether tenure regularization efforts are warranted and the form they should take depends on incidence, levels, and productivity impacts of perceived tenure insecurity. Despite its relevance for policy, studies of this topic are limited.<sup>9</sup> In Burkina Faso conflict risk -emanating largely from migrants- was estimated to have reduced agricultural productivity by at least 8.9% (Linkow 2016). In Uganda, females have been shown to be more likely to be involved in land disputes, many inheritance-related, and this is estimated to reduce investment by close to 7% (Deininger and Castagnini 2006). In the case of Malawi, Place and Otsuka (2001), Lunduka (2009), and Lovo (2016) postulate that discrepancy between males as prime decision-maker and females' land ownership in matrilineal/matrilocal systems is a key source of tenure insecurity with negative impacts on investment and provide some evidence to support this notion with data.

Assessing the size of productivity impacts of perceived tenure insecurity and the extent to which they vary by gender allows us put this into context and to assess whether, beyond being statistically significant, investment disincentives due to the inheritance regime are economically meaningful, and to draw out policy

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<sup>7</sup> In Sept. 2016, four out of ten bills aiming to ensure action on this front were passed by Parliament. While action will be impossible without passage of additional pieces, in particular the land registration Bill, drafting implementing regulations in line with current technological possibilities and ground realities will require careful piloting.

<sup>8</sup> Facilitating female ownership of assets through informal and formal institutions does not, on its own, increase welfare when appropriate complementary resources and institutions are absent (Bhaumik *et al.* 2016).

<sup>9</sup> While a number of studies have explored impacts of efforts to improve tenure security (Deininger and Jin 2006), perceived tenure insecurity has received surprisingly little attention in the literature. (Holden *et al.* 2011).

implications, noting that from an economic perspective, intervention programs are warranted only if the impacts of tenure insecurity are larger than the cost of implementing a program to reduce tenure insecurity.<sup>10</sup>

### **3. Data and descriptive evidence**

Descriptive data highlight three results. First, tenure insecurity is high with 22% of cultivators concerned about land loss and 15% having experienced land disputes in the last decade. Second, village data highlight increased land scarcity and transactions. Finally, comparing the productivity of estates with that of smallholders points towards marked differences in terms of intensity and efficiency of land use, including a pronounced negative relationship between farm size and productivity over the entire farm-size spectrum.

#### **3.1 Sampling and characterization of smallholder farmers**

Our data are from the 2006/07 NACAL implemented by Malawi's National Statistical Office (NSO) with the Ministry of Agriculture. Beyond household-, individual-, and village-level data collection instruments administered to a sample of smallholders, the survey also includes estates. While estates were drawn from a nation-wide list,<sup>11</sup> smallholder farms to be sampled were selected in two stages: In a first stage, enumeration areas (EAs) were randomly selected by district with stratification by agro- ecological zone and a listing conducted in those that had been selected. In the second stage, farm households in each of the selected EAs were randomly drawn with a target of 10 small (< 2 acres) and 5 medium sized ( $\geq 2$  acres) farms each.<sup>12</sup> For a sample of 931 estates and 23,896 smallholder farmers, the survey collected information on household composition, welfare, food security, assets (incl. livestock), marketing, and parcel-level data on land tenure and investment, in the 12-month period starting October 2006. Data gaps reduced the sample for our analysis to 17,672 smallholders and 868 estates with complete information. Also, to reduce error from misreporting due to intra-household informational asymmetries that are widespread in developing countries (Goldstein and Udry 2008; Udry 1996) including Malawi (Lovo 2016; Telalagic 2012), we restrict the regression sample for estimating impacts of insecure tenure to parcels operated by the respondent, which reduced the sample to 15,472 smallholders.<sup>13</sup>

The data point towards widespread tenure insecurity: 22% and 21% of respondents voice concern that their land may be taken away or encroached upon. In the past decade, 15% of respondent households experienced a land dispute (table 1). While there is no information disputes nature or start date to link to the case study

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<sup>10</sup> Implementation costs can be reduced through participatory approaches based on general boundaries as in Rwanda with costs of US\$5 per parcel (Ali *et al.* 2016a; Ali *et al.* 2014a) or even more via group approaches as in Mozambique (Kaarhus and Dondeyne 2015).

<sup>11</sup> Availability of a complete list of estates is a key advantage of this study over earlier ones where inability to compile the needed information made sampling very difficult (Abeyasekera 1997).

<sup>12</sup> In EAs with less than 5 small farms, small farms were added to bring the total sample to 15.

<sup>13</sup> Coefficients of interest for the entire sample have the same sign but are less precisely estimated, consistent with the notion that information on parcels that are not operated by the respondent contains considerable measurement error.



literature (Peters 2007; van Donge 1999), elders and traditional leaders play an important role and resolve some 60% of disputes. For most households, insecure tenure adds to an already precarious situation: 30% and 17% of respondents experienced theft of crops and livestock, respectively, in the last 5 years. Housing is basic with 75% having a grass roof and 79% a mud floor. With only about 40% having more than 5 years of schooling, education may limit participation in more demanding off-farm activities even if demand exists (Dimova *et al.* 2015; Nagler and Naude 2014). High food price variability (Harttgen *et al.* 2016), marked seasonality (Sassi 2015) and exposure to rainfall risks (Lewin *et al.* 2012), and health shocks (Hyder *et al.* 2015) in a situation of limited asset ownership and insurance access are reasons why 28% of respondent households had not eaten normally the last seven days and 19% had at least one member seriously sick. Land lease markets are incipient (Lunduka *et al.* 2009), with 6% of households participating.

The mean smallholder parcel had been in use for some 12 years and measures 0.61 ha (table 2). While most smallholder land is customary (77%), 20% is under other tenures including freehold. Inheritance remains the main avenue of accessing land in Malawi (Peters 2010; Takane 2008); two-thirds of parcels were acquired in this way, followed by allocation via the village headman (19%), rental (4%), and purchase (2%). While most parcels (80%) are owner-operated, only 58% of operators were born in the village, highlighting the increased importance of migration. Most sample parcels (77%) are in the village in flat terrain (73%) with 15% mountainous and 8% in valley bottoms. Few producers adopted fertility-improving practices such as fallowing (15%), crop rotation (13%), or terracing (7%) and planting of fruit (18%) or other trees (8%). Most of smallholders' land area is used for maize (46%) followed by wheat (24%), sorghum/millet (10%) and various crops including legumes, tubers, and cash crops including coffee or tobacco that together account for some 20% of area. With an output value of 305 US\$/ha at the 2006 exchange rate, organic manure is used on 36% of plots, improved seed on 11%, and chemical fertilizer on 7%. Data on labor use allows inferences only on which household members participated in specific tasks, suggesting that land preparation and management tasks such as ridging and weeding are, with very few exceptions, performed manually with females being more involved than men.

Village level variables highlight Malawi's diversity in terms of inheritance practices (Berge *et al.* 2014) and the extent to which land scarcity has increased market activity or given rise to intensification (table 3). 67% of villages follow matrilineal inheritance patterns (61%, 33%, and 6% of which matri-, patri-, or neo-local), 28% a patrilineal one (93% and 7% of which patri- and neo-local), and 5% others. With 84% and 79%, respectively, matrilineal inheritance prevails in the South -where matrilocality dominates- and the Center -where villages are almost equally split between matri- and patri-locality. It is virtually absent in the North where only 2% of villages report to follow a matrilineal and patrilocal inheritance pattern.

Limits on land availability are evident from the fact that only 11% or 31% of villages still have uncultivated or unallocated land available and that in 11% of villages, households have moved out to escape land shortage. Village land is no longer exclusively used by villagers either, as 37% have village land owned by outsiders and 34% rent village land to them (21% where outsiders own and rent village land). Higher outside demand for land is also visible from the fact that 11% and 15% of villages had, in the last 5 years, sold or given land to outsiders, sometimes (14%) failing to respect the village head's authority. Land conflict is becoming more frequent: 29% and 20% of villages reported conflict among village families or with neighboring villages, respectively. Some 24% of villages are located within walking distance from estates and in more than a fifth of these cases, land conflicts with neighboring estates are reported. Infrastructure access remains limited with only 35% of villages connected to an all-season road.

### **3.2 Comparison of land use and productivity between smallholders and estates**

Our survey comprises small and large farms. We can thus compare the intensity and productivity of land use between smallholders and estates to assess the long-term impact of land transfers to estates as well as the extent to which rental or sales markets can attenuate dualistic structures and equalize returns between different types of producers. Doing so allows us to see if, as some have claimed, studies of the relationship between farm-size and productivity that rely on household samples may miss a significant part of the distribution and thus come to erroneous conclusions (Jayne *et al.* 2015).

Comparing smallholder with estate data provides interesting insights in a number of respects. Mean age for the 868 estates with data is 19 years with largest estates the oldest (table 4). Most (68%) are owned by natural persons of Malawian nationality, 16% by 'others' -most likely legal persons- and 10% by expatriates. Expatriates' ownership share peaks at the 100-500 ha size while that of government and 'others' peaks in the greater than 500 category. In contrast to smallholders, almost all estates (87%) use fertilizer and close to two-thirds (61%) purchase pesticide or seeds, a practice more prevalent for larger sizes in both cases. With about a third of estates having tenants; the share of estates with tenants peaks at close to 50% in the 10-100 size category. Compared to large farms in other countries that produce bulk commodities and often generate little employment (Ali *et al.* 2015), many of Malawi's estates are quite labor intensive. Permanent or temporary male (female) labor is hired by 60% (25%) and 66% (52%) of estates respectively. For these, demand for permanent labor per ha cultivated is almost equal to the amount of labor spent by smallholders based on the 2010/11 LSMS-ISA survey (Deininger *et al.* 2015). It increases with size to about 0.9 males and 0.6 females in the largest category though the pattern for temporary labor is more volatile.

Claims about un- or underused estate land recurred in Malawi's policy debate (Holden *et al.* 2006). While our sample was not designed to provide conclusive evidence on this, data suggest that for surveyed estates,

15% of allocated land is operated, a share that decreases from 88% in the group below 5 ha to 11% in the above 500 ha group (table 5). While smallholders below 1 ha cultivate more than 95% of their land, mean land use intensity for the few (154) smallholder farmers with more than 10 ha is only 22%.

Recent digitization of all the country's estate leases by a World Bank supported project supports these general conclusions. It puts the number of leases at 58,733 (of which 35,140 are in agriculture) and suggests that the majority is expired. Even if 40% of the land leased to estates were non-existent or unsuitable for agriculture, collecting lease fees equivalent to the median value of rent paid (or self-declared willingness to pay) in the 2010/11 IHS for the remainder would generate a total of close to US\$50 million per year, in lease fees. Further analysis to eliminate overlaps and so-called 'ghost estates',<sup>14</sup> align registered estate boundaries with actual land use, trace changes in ownership or occupation, and renew expired leases can help further refine this. Analysis also suggests that not all estate land may be effectively used.<sup>15</sup>

Comparing production structure between smallholders and estates reveals differences in cropping patterns: for sampled estates, 42% of area is devoted to tobacco, followed by maize (39%), groundnuts (7%), and other crops (table 5). While differences in terms of crop composition somewhat limit the scope for comparing yields, mean values suggest that for all crops with the exception of sunflower and tea, yields by smallholders are significantly above those by estates. As estates use consistently more inputs than smallholders, this suggests a strong negative relationship between farm size and productivity on the land area actually cultivated. Non-parametric regressions of maize, rice, tobacco and coffee yields for the pooled sample plotted against the log of farm size in figures 1a-1d graphically illustrate that, although slope varies by crop, the overall relationship is stable and rather tightly estimated.

#### **4. Econometric results**

Regression results support the notion that perceived risk of land loss was higher for the poor, strangers, people who transacted land, and those who had experienced land loss/encroachment or were involved in land disputes earlier. Fear of land loss is estimated to reduce productivity by 5% overall, an effect limited to females who, as a result of fearing land loss, are estimated to incur losses of 12%. While this would be large enough to fund a systematic low-cost program of land regularization to eliminate insecurity, the net effect of matrilineal inheritance on productivity remains limited.

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<sup>14</sup> Coordinates in relevant survey plans imply that about one-third (19,222 of the 58,733 estates) are located outside Malawi and further study is needed to determine whether this is due to transcription errors or whether estates in question do not exist.

<sup>15</sup> Of the 26,277 agricultural estates for which cloud free SPOT 2013/15 satellite imagery was available, 11,287 (43%) left more than 50% of their total (cloud-free) land area uncultivated. While data would need to be updated to improve coverage and fine-tune land use classifications, freely available imagery offers immense opportunities for doing so.

#### 4.1 Determinants of perceived tenure insecurity

We identify household-level determinants of perceived tenure insecurity<sup>16</sup> by estimating

$$TI_{ijk} = \beta_0 + \beta_1 DX_{ijk} + \beta_2 DV_{jk} + \beta_3 X_{ijk} + \beta_4 V_{jk} + \lambda_k + \varepsilon_{ijk} \quad (1)$$

where  $TI_{ijk}$  is an indicator variable for household  $i$  in village  $j$  and district  $k$  expressing fear that his/her land may either be taken away or be encroached upon.  $DX_{ijk}$  is a vector household level variables that may affect perceived tenure insecurity with variables from three main groups, namely (i) respondent characteristics such as gender, age, education level, main job, and whether born within or outside the village; (ii) tenure of the household's parcels, in particular the share that is customary, leasehold, freehold, or on public land; the share of parcels acquired in different ways;<sup>17</sup> mean length of possession; the share of parcels for which owner and operator are identical; the share of parcels within rather than outside the village; and the share of land leased, all aggregated with area shares from parcel to household level; and (iii) indicator variables for having experienced land disputes, encroachment, or land loss during the last decade or crop theft in the last growing season and food insecurity during the 7 days preceding the survey.  $DV_{jk}$  is a vector of village-level variables that may affect insecurity, including whether the village still has unallocated (reserve) land available, if there are estates within walking distance, and if during the last decade households moved out either due to land conflict or to look for land to cultivate.<sup>18</sup>  $X_{ijk}$  is a vector of household-level controls that includes size of total land owned and cultivated, the share of area with different topography, demographic composition, ownership of durable goods, agricultural assets, and livestock as well as housing conditions.  $V_{jk}$  is a vector of village-level controls including road access and marriage type (matrilineal and matrilocal/neolocal, matrilineal and patrilocal, patrilineal and patrilocal/neolocal, or unknown),  $\lambda_k$  is a vector of district fixed effects,  $\beta_1$  and  $\beta_2$  are parameter vectors to be estimated, and  $\varepsilon_{ijk}$  is an *iid* error term.

Coefficients in table 6 regarding fear of land being taken (cols.1 & 2) or encroached upon (cols.3 & 4)<sup>19</sup> are reported overall (cols. 1&3) and for specifications where impacts of past land loss or encroachment are allowed to differ by gender. Past loss is estimated to increase the fear of land being taken by 10% irrespective of gender while past encroachment affected fear of future encroachment more than past loss with point estimates of 34% and less than 7%, respectively, and the latter insignificant for male respondents.

In addition, having had disputes in the past is the most important factor (15% to 23%), supporting case study evidence of traditional institutions often failing to conclusively resolve disputes. The poor are more

<sup>16</sup> As noted earlier, information on subjective tenure insecurity is not available at parcel level.

<sup>17</sup> Categories include whether land was acquired from the village headman, inherited/kept when spouse passed away, borrowed or inherited from parents, obtained from government, or bought, rented or borrowed from others.

<sup>18</sup> As we are interested to see whether the magnitude of threats from estates varies by availability of land, an interaction term between the indicator variable for having unallocated land and the indicator variable for having estates within walking distance is also included in  $DV_{jk}$ .

<sup>19</sup> All variables in equation (1) are included in the regressions but only variables that significantly affected the fears are displayed in table 6.

tenure insecure; not having eaten normally in the last 7 days and having experienced crop theft estimated to increase the perceived danger of land loss by 5% and 3%, respectively. In line with the findings from studies suggesting that traditional systems make it difficult for ‘strangers’ to acquire land, having borrowed land is estimated to have increased the risk of expropriation by 7% without effect on encroachment risk, while renting out land increases perceived risk in both areas by 3%, about the same as having all land located outside the village (which affected the fear of encroachment more than fear of expropriation). Having been born in the village and identity of owner and operator reduced perceived likelihood of land being taken (encroached) by 5% (2%) and 5% (4%), respectively with each year of land occupation reducing the fear of expropriation by 1% but not affecting perceived encroachment risk.

Village-level factors are estimated to have affected fear of land loss but less of encroachment. Villagers are estimated to be 5% likely to fear land loss if other households had moved out due to land conflict. Presence of estates in walking distance or unallocated land in the village are estimated to each have increased the fear of land loss by 3%, presumably by increasing competition over land or by prompting certain groups to try and acquire land ahead of others. The interaction between these two variables is positive with a point estimate of 6%, suggesting that in presence of unallocated land, positive effects (e.g. employment) from estates outweighed negative ones.

To compare our results to impacts attributed to inheritance regimes in the literature, we include dummies on prevailing inheritance regimes and their interactions with operator’s gender. We find that in matrilineal regimes, male operators’ perceived risk of land loss is increased by 7.1%. By comparison, the fear of land being encroached is lower by 4-5 points in patrilineal systems for women and weakly significant for males, suggesting that the inheritance regime is one of several factors, and apparently not the most important, that affect tenure insecurity.

Using the fear of (future) land loss as a right hand side variable in the equations for investment undertaken in the past (any time after land acquisition) would suffer from reverse causality. Assuming that the inheritance regime did not change in the period of interest, we can still test for its impacts on investment by estimating specifications similar to (1) with the dependent variable being whether a household had planted fruit trees, built terraces, or practiced crop rotation. Results from doing so in table 7, which suppresses estimated coefficients for all remaining variables, fail to provide strong support to the notion of matrilineal inheritance regimes as a major cause of low investment: To the contrary, overall likelihood of planting fruit trees is significantly higher in matrilineal systems, though estimated coefficients are insignificantly different from zero for males. Terracing is significantly less likely in patrilineal systems for males and females. Finally, for crop rotation, arguably a very short-term measure, investment is indeed

lower in matrilineal and ‘other’ compared to patrilineal systems (table 7, col. 5) but gender disaggregation suggests that in both matri- and patrilineal regimes, it is males who invest less.

#### 4.2 Impacts of tenure insecurity on productivity

To quantify the impacts of tenure insecurity on production, we let  $Q_{lpijk}$  be the value of output by household  $i$  in village  $j$  and district  $k$  on plot  $l$  of parcel  $p$ .  $A_{lpijk}$ ,  $L_{lpijk}$ , and  $K_{lpijk}$  denote crop area; a vector of labor variables including no. of household members by gender and age participating in land preparation, planting, weeding and harvesting, the no. of hired workers, and an indicator of whether the household participated in exchange labor; and a vector of values of organic manure, chemical fertilizer, seeds used in production as well as agricultural assets.<sup>20</sup> Taking logarithms on both sides yields

$$q_{lpijk} = \delta_0 + \delta_1 TI_{ijk} + \delta_2 PL_{lpijk} + \delta_3 PA_{pijk} + \delta_4 X_{ijk} + \delta_5 V_{jk} + \delta_6 DPA_{pijk} + \delta_7 DX_{ijk} + \delta_8 DV_{jk} + \delta_9 I_{pijk} + \lambda_k + \theta_1 a_{lpijk} + \theta_2 l_{lpijk} + \theta_3 k_{lpijk} + \varepsilon_{lpijk} \quad (2)$$

where  $q_{lpijk}$ ,  $a_{lpijk}$ ,  $l_{lpijk}$ , and  $k_{lpijk}$  are logarithms of  $Q_{lpijk}$ ,  $A_{lpijk}$ ,  $L_{lpijk}$ , and  $K_{lpijk}$ , and  $\theta$ s are technical coefficients to be estimated. We include indicator variables for zero values of inputs following (Battese 1997). While  $TI_{ijk}$ ,  $DV_{jk}$ ,  $V_{jk}$  and  $\lambda_k$  are defined as in (1), parcel- and household-level determinates of tenure insecurity and controls are separated in equation (2) with parcel-aggregated characteristics excluded from  $DX_{ijk}$  and  $X_{ijk}$  and included in parcel-level vectors of  $DPA_{pijk}$  and  $PA_{pijk}$ . We also control for household-level extension activities and plot-level indicators for whether the plot was ridged and weeded, and the share of crop area devoted to each of the main crops, which may affect production but not fear.  $\delta_l$  is the parameter of interest that quantifies the impacts of tenure insecurity. To explore if insecurity (fear of land loss or encroachment) affects production either directly or indirectly, we estimate three specifications based on (2), namely (i) one where tenure insecurity determinates ( $DPA_{pijk}$  and  $DX_{ijk}$  and  $DV_{jk}$ ) and investment ( $I_{pijk}$ ) are excluded; (ii) one where the effect of tenure insecurity is allowed to vary by gender; and (iii) one where investments are also included with tenure insecurity determinants controlled for.<sup>21</sup>

Results are illustrated in table 8.<sup>22</sup> The fear of land being taken away is estimated to have reduced output by 5% overall but we note that this result is driven by female operators whose output declined by 12% as a result of tenure insecurity while results from the relevant test in the table’s bottom row suggest that tenure insecurity in terms of the fear of land loss (as well as land being encroached) has no perceptible impact on productivity for males. Signs and significance on inputs are as expected with land contributing most (40%), followed by chemical fertilizer (11%), seed (10%), agricultural assets and organic manure (6%). Although

<sup>20</sup> Hired labor, exchange labor, and agricultural assets are household-level variables.

<sup>21</sup> For space reasons, we only report the coefficient on the crop rotation indicator noting that coefficients on other investments are insignificant.

<sup>22</sup> All variables in equation (2) are included in the regressions but only fear-related variables, variables for investments, and variables for inputs of the production function are displayed in table 8.

the survey's measure of family labor, i.e. if males, females, or children household members participated in certain types of activities is extremely imprecise, it made a positive contribution to output.<sup>23</sup> Each added sick member over the last three months is estimated to have reduced output by 4 points. Participation in exchange work, presumably to break seasonal bottlenecks, is estimated to have increased production by 8 points and the coefficient on extension is positive but insignificant.

One advantage of (2) is that it allows us to combine direct and indirect impacts to assess if and to what extent inheritance regimes affects productivity.<sup>24</sup> To obtain such estimates, we add (in col. 3 and 6), an indicator variable for whether or not a household practiced crop rotation, the one investment that, based on our earlier results is significantly affected by inheritance regimes (see table 7). Results provide no basis for the conjecture of matrilineal systems being associated with lower levels of productivity, irrespective of the inclusion of a crop rotation dummy. For patrilineal regimes, a significant negative effect emerges for specifications that do not control for crop rotation but disappears if gender or the respective indicator are included, suggesting that even in patrilineal systems, failure to practice crop rotation rather than the inheritance regime per se, is associated with lower levels of productivity.

## **5. Conclusion and policy implications**

Data from Malawi allow us to assess the extent to which large farms (estates) established sporadically and in isolation from the customary sector in the late 1980s helped to establish a dynamic commercial farm sector. We find that in most cases, estates' productive performance is inferior to that of smallholders while in the smallholder sector, fear of land loss is high and associated with significant productivity losses for female cultivators, and, contrary to earlier literature, the inheritance regime is not a major impediment to smallholder investment or productivity. The estimated present value of fear-induced productivity losses is estimated to exceed the amount of resources required to implement a low-cost systematic tenure regularization program along the lines of Rwanda.

Two implications for policy stand out. First, even in the customary regime, piloting of approaches to secure tenure especially for women, accompanied by careful real-time evaluation, could thus help inform next steps to feed into regulation for Land Bill implementation. Second, where land had been transferred to estates historically, this would need to be preceded by use of digitized administrative data -including on boundaries or (expired) lease documents- to adjudicate rights in a way that, where needed, would reconcile legal rights with current occupancy status. Major steps for doing so would include (i) revision of lease fees to bring them more in line with productive potential; and (ii) establishment of a systematic process to

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<sup>23</sup> Estimated coefficients on male members' input are slightly above that for women and children or hired workers

<sup>24</sup> Such analysis will be valid if inheritance regimes are exogenously given and do not change over time.

ascertain and formally register location and occupancy of land leased to estates, extinguish rights to ‘ghost’ estates, adjudicate overlapping claims, and as much as possible allow market-based reassignment of unused land to more productive uses. Impacts on own-source revenue generation could be very large: Our estimates suggest that, beyond supporting greater efficiency of land use and opening up avenues to access land via lease markets, incremental public revenue to be generated through realistic lease fees could potentially be very large, amounting to up to US\$50 mn. per year, equivalent to 5% of public revenue.

Follow-up research will be of interest in two areas. The first relates to determinants of estates’ productive performance and their impact on neighboring smallholders in ways going beyond averages and exploring heterogeneity across estates. This could combine survey data on location and actual occupancy of estate land with more specific methods of imagery recognition to assess not only current land use but to rely on historical imagery to also provide evidence on changes over time. Beyond providing a basis for any effort at systematic lease updating, this could help assess estates’ effect on neighboring smallholders in a way that would complement existing methodologies such as Ali *et al.* (2016c) with evidence on channels via which such effects may be transmitted. A second area for follow-up research relates to exploring ways in which smallholders’ tenure insecurity could be reduced in different settings and to assessing productivity impacts of such interventions. This could improve not only understanding of production relations in Malawi, but also help ensure that efforts at systematic tenure regularization address these so as to have the desired impact on smallholder productivity and welfare.



**Table 1: Household characteristics**

	All Malawi	North	Region Central	South	Operator's gender		t-test
					Male	Female	
<b>Household characteristics &amp; assets</b>							
Female head	0.29	0.25	0.26	0.32	0.06	0.49	***
Number of children	2.31	2.58	2.33	2.21	2.31	2.32	
Number of adults	2.45	2.82	2.46	2.32	2.58	2.33	***
Number of old people	0.19	0.20	0.18	0.20	0.19	0.20	
Own radio	0.64	0.69	0.62	0.64	0.73	0.56	***
Own cell phone	0.13	0.18	0.11	0.12	0.12	0.13	**
Did not eat normally last 7 days	0.28	0.24	0.28	0.30	0.27	0.29	***
Had members with serious sickness	0.19	0.19	0.21	0.18	0.19	0.19	
Had member passed away last year	0.05	0.05	0.04	0.05	0.04	0.05	***
Agricultural implements (US\$)	16.43	30.54	17.86	10.54	20.30	12.91	***
Livestock and poultry (US\$)	321.28	885.89	320.26	131.84	530.40	131.14	*
Owned cow	0.05	0.17	0.03	0.03	0.07	0.04	***
Owned goat	0.22	0.17	0.23	0.22	0.24	0.19	***
Owned pig	0.09	0.20	0.09	0.05	0.11	0.07	***
Owned poultry	0.50	0.69	0.46	0.46	0.54	0.45	***
<b>Housing characteristics</b>							
Grass roof	0.75	0.70	0.80	0.72	0.76	0.73	***
Iron sheets roof	0.25	0.30	0.19	0.28	0.23	0.26	***
Smoothed mud floor	0.79	0.76	0.82	0.76	0.79	0.78	**
Smoothed cement floor	0.17	0.23	0.14	0.18	0.16	0.18	***
Mud walls	0.09	0.11	0.09	0.08	0.09	0.09	
Compacted earth walls	0.17	0.24	0.32	0.02	0.19	0.15	***
Mud brick walls	0.34	0.10	0.28	0.47	0.31	0.37	***
Burnt brick walls	0.38	0.51	0.29	0.41	0.39	0.37	*
<b>Respondent characteristics</b>							
Female	0.52	0.48	0.49	0.57	0.00	1.00	
Age	40.30	40.97	39.68	40.56	40.87	39.78	***
No schooling at all	0.29	0.12	0.31	0.34	0.21	0.37	***
Primary 1-5	0.29	0.23	0.31	0.29	0.28	0.30	**
Primary 6-8	0.28	0.41	0.27	0.25	0.33	0.24	***
Secondary and above	0.14	0.23	0.12	0.12	0.19	0.09	***
Born in the village	0.54	0.48	0.55	0.56	0.54	0.55	**
Main job non agriculture	0.34	0.39	0.36	0.32	0.34	0.35	
<b>Land tenure &amp; agriculture</b>							
Fear land will be taken away	0.22	0.18	0.25	0.20	0.24	0.20	***
Fear land will be encroached upon	0.21	0.19	0.25	0.18	0.22	0.20	***
Experienced crop theft last 5 years	0.30	0.28	0.30	0.32	0.31	0.30	
Experienced livestock theft last 5 years	0.17	0.17	0.19	0.16	0.18	0.16	***
Had disputes over land in the past 10 years	0.15	0.17	0.17	0.14	0.17	0.14	***
If yes, share not resolved	0.14	0.18	0.14	0.13	0.14	0.15	
If yes, share resolved by the household	0.18	0.18	0.15	0.21	0.19	0.17	
If yes, share resolved by elders (husband side)	0.09	0.12	0.09	0.08	0.09	0.08	
If yes, share resolved by elders (wife side)	0.27	0.08	0.29	0.34	0.26	0.29	*
If yes, share resolved by traditional leaders	0.24	0.38	0.27	0.16	0.26	0.22	**
If yes, share resolved by others	0.06	0.05	0.05	0.06	0.05	0.07	
Had land taken away last 10 years	0.014	0.011	0.017	0.012	0.015	0.012	
Had land encroached upon last 10 years	0.020	0.024	0.022	0.018	0.018	0.022	*
Rent out some land	0.06	0.05	0.08	0.06	0.07	0.06	***
Rental (US\$/ha)	20.55	27.59	22.83	15.54	22.03	18.82	
Participated in exchange work	0.20	0.31	0.24	0.14	0.21	0.20	
Attended extension activities this season	0.19	0.32	0.17	0.16	0.21	0.17	***
Number of activities attended	0.56	0.97	0.48	0.49	0.64	0.49	***
Number of households	15472	2453	5739	7280	7368	8104	

Source: Own computation from 2006/07 NACAL. Last column contains t-tests for difference in manse between males and females (\*\*\* p<0.01, \*\* p<0.05, \* p<0.1).

**Table 2: Smallholder parcel and plot statistics**

	All		Region		Respondent gender		t-test
	Malawi	North	Center	South	Male	Female	
Parcel characteristics							
Area (ha)	0.61	0.36	0.93	0.46	0.68	0.50	***
Years used	11.58	9.47	11.51	12.47	10.31	13.66	***
Share customary	0.77	0.78	0.75	0.77	0.77	0.76	***
Share freehold	0.20	0.18	0.20	0.20	0.19	0.21	***
Inherited from parents/spouse	0.66	0.53	0.65	0.65	0.63	0.63	
Received from village headman	0.19	0.23	0.17	0.19	0.19	0.19	
Bought	0.02	0.03	0.02	0.02	0.02	0.02	
Rented/borrowed	0.04	0.05	0.05	0.03	0.04	0.03	***
Mountain slope	0.15	0.25	0.13	0.13	0.15	0.15	
Dregs	0.08	0.07	0.06	0.10	0.08	0.08	
Plain	0.73	0.63	0.78	0.73	0.74	0.73	
Located in the village	0.77	0.84	0.73	0.78	0.77	0.78	**
Located outside village but same TA	0.23	0.16	0.27	0.22	0.23	0.22	**
Owner characteristics							
Operator is owner	0.81	0.81	0.81	0.81	0.79	0.84	***
Female operator	0.38	0.34	0.33	0.44	0.00	1.00	
Operator's age	43.13	43.80	42.21	43.60	41.61	45.61	***
Operator not completed any school	0.27	0.12	0.29	0.32	0.18	0.42	***
Operator with primary 1-5	0.29	0.24	0.31	0.30	0.29	0.30	**
Operator with primary 6-8	0.30	0.40	0.28	0.26	0.34	0.22	***
Operator with secondary and above	0.14	0.23	0.12	0.11	0.19	0.06	***
Operator born in the village	0.58	0.57	0.60	0.57	0.54	0.63	***
Land-related investment							
Practiced crop rotation	0.13	0.14	0.23	0.04	0.15	0.09	***
Built terrace	0.07	0.03	0.09	0.07	0.08	0.07	
Fallowed last 3 years	0.15	0.18	0.16	0.12	0.15	0.14	**
Operator planted fruit trees	0.18	0.17	0.17	0.20	0.18	0.19	**
Operator planted non-fruit trees	0.08	0.04	0.09	0.08	0.08	0.07	**
Plot use							
Plot area (ha)	0.43	0.29	0.55	0.39	0.46	0.39	***
Crop area (ha)	0.39	0.28	0.51	0.34	0.42	0.35	***
Share of area maize	0.46	0.38	0.47	0.49	0.43	0.52	***
Share of area wheat	0.24	0.26	0.26	0.22	0.27	0.20	***
Share of area sorghum/millet	0.10	0.07	0.11	0.08	0.09	0.08	*
Share of area rice	0.08	0.08	0.10	0.07	0.08	0.07	**
Share of area coffee	0.02	0.07	0.02	0.01	0.02	0.02	**
Share of area tobacco	0.01	0.00	0.00	0.01	0.01	0.01	
Output and inputs							
Output value (US\$/ha)	304.51	416.52	256.33	303.92	319.65	284.07	***
Used organic manure	0.36	0.41	0.42	0.30	0.38	0.34	***
Value of organic manure (US\$)	4.20	5.35	5.33	2.96	4.55	3.74	***
Used chemical fertilizer	0.07	0.05	0.04	0.11	0.07	0.07	
Value of chemical fertilizer (US\$)	0.19	0.16	0.13	0.24	0.19	0.18	
Purchased seed	0.11	0.07	0.15	0.10	0.12	0.10	***
Value of seed (US\$)	0.40	0.26	0.60	0.30	0.49	0.28	***
Plot ridged	0.91	0.86	0.96	0.88	0.91	0.91	
Plot ridged manually	0.89	0.80	0.96	0.87	0.89	0.90	*
Plot planted manually	1.00	0.99	1.00	1.00	1.00	1.00	
Plot weeded	0.99	0.99	0.99	0.99	0.99	0.99	
Plot weeded manually	0.99	0.98	0.99	0.99	0.99	0.98	
Male members worked on plot	0.75	0.80	0.78	0.72	0.97	0.46	***
Female members worked on plot	0.96	0.95	0.96	0.96	0.93	0.99	***
Children worked on plot	0.34	0.43	0.33	0.32	0.33	0.36	***
Number of plots	13367	2357	4826	6184	8159	5208	
Number of parcels	17154	3108	6191	7855	10629	6525	

Source: Own computation from 2006/07 NACAL (regression sample only). Household members working on a plot are defined as engaged in all 4 activities. t-tests for differences in means between males and females (\*\*\* p<0.01, \*\* p<0.05, \* p<0.1).

**Table 3: Descriptive statistics at village level**

	All	Regression Sample		
		North	Center	South
<b>Availability of land</b>				
Uncultivated land available	0.11	0.11	0.14	0.08
Unallocated land available	0.31	0.42	0.34	0.23
Households moved out due to land shortage	0.11	0.07	0.11	0.14
Outsiders get land without consulting village head	0.14	0.15	0.14	0.15
Sold land to outsiders in last 5 years	0.11	0.04	0.13	0.11
Gave land to outsiders in last 5 years	0.15	0.15	0.16	0.13
Has land owned by outsiders	0.37	0.33	0.34	0.41
Has land rented to outsiders	0.34	0.20	0.38	0.36
Has land taken by the government	0.14	0.19	0.12	0.14
<b>Incidence of land conflict</b>				
Land conflicts by village families	0.29	0.28	0.28	0.32
Land conflict with neighboring villages	0.20	0.18	0.20	0.19
Estates within walking distance	0.24	0.26	0.26	0.22
Land conflict with neighbouring estates	0.05	0.04	0.06	0.04
<b>Inheritance practices</b>				
Inheritance matrilineal and neolocal	0.04	0.00	0.03	0.07
Inheritance matrilineal and matrilineal	0.41	0.00	0.32	0.71
Inheritance matrilineal and patrilineal	0.22	0.02	0.44	0.06
Inheritance patrilineal and neolocal	0.02	0.01	0.02	0.02
Inheritance patrilineal and patrilineal	0.26	0.93	0.14	0.10
Inheritance do not know/other	0.05	0.04	0.06	0.04
<b>Infrastructure access</b>				
All season road passes through the village	0.35	0.45	0.36	0.28
if no, distance to all season road (km)	10.15	6.26	10.35	11.32
Other road passes through the village	0.79	0.71	0.77	0.84
Distance to local produce market (km)	8.71	10.41	9.42	7.14
Number of villages	4107	729	1784	1594

Source: Own computation from 2006/07 NACAL.

**Table 4: Estate characteristics**

	All	<=5	5-10	Size category in ha			
				10-50	50-100	100-500	>500
<b>Estate ownership</b>							
Years run by the current owner	19.00	13.14	12.54	15.28	21.13	19.84	30.77
Owner is Malawian	0.68	0.75	0.83	0.92	0.80	0.51	0.30
Owner is expatriate	0.10	0.13	0.00	0.01	0.04	0.29	0.21
Owner is other	0.16	0.13	0.14	0.05	0.06	0.13	0.34
Owner is government	0.02	0.00	0.00	0.00	0.03	0.05	0.05
Owner is NGO	0.03	0.00	0.03	0.02	0.06	0.03	0.07
<b>Purchased inputs</b>							
Share purchased fertilizer	0.87	0.75	0.83	0.96	0.90	0.94	0.93
Cost of fertilizer (US\$/ha)	192.07	161.49	118.10	149.67	175.00	270.19	250.14
Share purchased pesticides	0.61	0.50	0.38	0.57	0.66	0.78	0.86
Cost of pesticides (US\$/ha)	27.70	26.17	3.30	8.48	12.49	60.83	62.44
Share purchased seed	0.61	0.50	0.62	0.68	0.71	0.61	0.60
Cost of seed (US\$/ha)	9.71	1.79	10.00	5.27	10.32	13.18	19.92
Share purchased other inputs	0.19	0.25	0.28	0.14	0.16	0.10	0.07
Cost of other inputs(US\$/ha)	1.79	0.00	19.47	1.30	1.56	1.66	0.02
<b>Labor demand</b>							
Hired perm. male labor	0.60	0.38	0.59	0.52	0.52	0.82	0.92
No. of perm. male labor	28.8	1.5	4.9	3.7	7.2	49.4	108.2
No. of perm. male labor per ha	0.60	0.50	0.93	0.40	0.45	0.89	0.88
Hired perm. female labor	0.25	0.25	0.17	0.12	0.24	0.48	0.52
No. of perm. female labor	13.0	0.8	1.0	1.3	1.9	13.7	65.8
No. of perm. female labor per ha	0.19	0.28	0.19	0.11	0.05	0.19	0.58
Hired temp. male labor	0.66	0.38	0.66	0.64	0.69	0.77	0.88
No. of temp. male labor	45.1	154.7	7.1	13.1	15.5	72.8	139.9
No. of temp. male labor per ha	1.51	31.28	1.96	1.48	0.96	1.14	1.03
Hired temp. female labor	0.52	0.13	0.45	0.47	0.54	0.65	0.79
No. of temp. female labor	23.6	2.0	8.2	6.9	10.9	34.7	79.5
No. of temp. female labor per ha	0.71	0.50	1.65	0.86	0.50	0.54	0.45
Total wage bill per ha (US\$)	131.94	249.74	144.41	133.59	174.60	138.20	77.63
<b>Tenancy</b>							
Have tenants	0.31	0.13	0.10	0.44	0.45	0.24	0.10
Number of tenants	3.70	0.83	0.73	2.40	6.06	4.64	5.77
No. of obs.	868	8	29	422	96	192	121

Source: Own computation from 2006/07 NACAL.

**Table 5: Comparing production and yields between estates and smallholders**

	Estates by size in ha							Smallholders by size in ha				
	All	<=5	5-10	10-50	50-100	100-500	>500	All	<=1	1-5	5-10	>10
<b>Land use</b>												
Area owned	433.9	4.0	8.5	21.6	74.3	272.4	2543.5	0.98	0.42	1.68	7.00	33.83
Area operated	67.0	3.5	5.8	10.3	27.4	80.2	294.5	0.64	0.40	1.23	5.60	7.48
<b>Share of area by crop</b>												
Tobacco	0.42	0.32	0.16	0.40	0.42	0.48	0.47	0.01	0.01	0.00	0.00	0.00
Maize	0.39	0.57	0.67	0.44	0.42	0.31	0.23	0.47	0.48	0.45	0.44	0.42
Wheat								0.26	0.26	0.26	0.24	0.26
Rice	0.01	0.00	0.00	0.01	0.00	0.02	0.01	0.08	0.08	0.08	0.15	0.10
Sorghum	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.09	0.09	0.10	0.10	0.11
Sunflower	0.02	0.00	0.01	0.02	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Groundnut	0.07	0.06	0.13	0.10	0.07	0.03	0.01	0.00	0.00	0.00	0.00	0.00
Soybean	0.01	0.06	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Coffee	0.01	0.00	0.00	0.00	0.01	0.03	0.02	0.02	0.02	0.02	0.01	0.04
Tea	0.04	0.00	0.00	0.00	0.00	0.06	0.17	0.00	0.00	0.00	0.00	0.00
Other crops	0.03	0.00	0.02	0.02	0.04	0.04	0.07	0.07	0.06	0.09	0.06	0.07
<b>Yield (kg/ha) by crop</b>												
Tobacco	960	854	1,047	905	1,089	1,010	1,000	1,413	1,433	1,313		
Maize	1,585	1,313	1,874	1,685	1,286	1,385	1,606	1,630	1,735	1,235	621	1,382
Wheat								1,996	2,128	1,596	574	1,188
Rice	1,123			1,310		750	750	1,842	1,986	1,484	571	809
Sorghum								1,869	1,967	1,645	503	1,165
Sunflower	,3058			3,692	1,417	2,140		2,474	2,489	2,418		
Groundnut	765		440	840	439	783	550	2,576	2,676	2,174		
Soybean	869	700	290	592	4,250	820	988	2,133	2,316	1,614		1,285
Coffee	1,323				45	1,598	1,215	2,803	2,902	2,601	241	1,883
Tea	648					1,537	370	419	444	358		
<b>Sample distribution</b>												
North	0.25	0.25	0.03	0.34	0.30	0.13	0.07	0.16	0.15	0.19	0.13	0.06
Center	0.57	0.38	0.72	0.62	0.57	0.49	0.56	0.38	0.35	0.46	0.54	0.70
South	0.19	0.38	0.24	0.05	0.13	0.38	0.37	0.46	0.49	0.35	0.33	0.23
No. obs	868	8	29	422	96	192	121	17,672	14,408	2,954	156	154

*Source:* Own computation from 2006/07 NACAL. Other crops for estates include beans, cotton, sugar cane. Other crops for smallholders include wheat, millet, beans, velvet beans, ground beans, pigeon peas, cow peas, cassava, sweet potato, irish potato, cotton, and sugar cane.

**Table 6: Determinants of smallholders' tenure insecurity**

	Indicator of tenure insecurity			
	Land may be taken away	Fear land encroached upon		
Had land encroached upon	0.095*** (0.027)	0.110*** (0.037)	0.339*** (0.028)	0.354*** (0.037)
Had land encroached upon*Male respondent		-0.035 (0.055)		-0.038 (0.055)
Had land taken away (exploited)	0.101*** (0.035)	0.091* (0.051)	0.072** (0.035)	0.092* (0.050)
Had land taken away (exploited)*Male respondent		0.022 (0.068)		-0.037 (0.067)
Had dispute with relative from husband side	0.212*** (0.024)	0.213*** (0.024)	0.230*** (0.024)	0.230*** (0.024)
Had dispute with relative from wife side	0.158*** (0.027)	0.158*** (0.027)	0.180*** (0.026)	0.180*** (0.026)
Had disputes with other relative	0.149*** (0.025)	0.151*** (0.025)	0.176*** (0.024)	0.177*** (0.024)
Had disputes with non-relative	0.177*** (0.015)	0.177*** (0.015)	0.229*** (0.015)	0.228*** (0.015)
Share of land rented in	0.013 (0.023)	0.011 (0.023)	0.016 (0.024)	0.015 (0.024)
Share of land borrowed	0.065*** (0.025)	0.065*** (0.025)	0.028 (0.025)	0.028 (0.025)
Renting out land	0.026* (0.014)	0.026* (0.014)	0.034** (0.015)	0.034** (0.015)
Share of land operated by owner	-0.053*** (0.012)	-0.053*** (0.012)	-0.044*** (0.011)	-0.044*** (0.011)
Mean no. of years cultivating land	-0.001** (0.000)	-0.001** (0.000)	0.000 (0.000)	0.000 (0.000)
Share of land located outside the village	0.026*** (0.010)	0.026*** (0.010)	0.034*** (0.009)	0.033*** (0.009)
Male respondent	0.001 (0.009)	-0.040** (0.016)	0.009 (0.008)	-0.004 (0.016)
Respondent born in the village	-0.051*** (0.010)	-0.045*** (0.010)	-0.020** (0.009)	-0.018** (0.009)
Respondent's main job is non agriculture	0.018** (0.009)	0.017* (0.009)	0.014 (0.009)	0.013 (0.009)
Did not eat normally last week	0.050*** (0.008)	0.050*** (0.008)	0.059*** (0.008)	0.059*** (0.008)
Experienced crop theft last 5 years,	0.027*** (0.008)	0.027*** (0.008)	0.025*** (0.008)	0.026*** (0.007)
Village had households moved out due to land conflict	0.053** (0.024)	0.053** (0.024)	-0.012 (0.023)	-0.012 (0.023)
Village had unallocated land	0.027** (0.011)	0.027** (0.011)	0.007 (0.010)	0.007 (0.010)
Village had estates within walking distance	0.027** (0.012)	0.027** (0.012)	0.014 (0.011)	0.014 (0.011)
Unallocated land*estates in walking dist.	-0.063*** (0.021)	-0.064*** (0.021)	-0.016 (0.021)	-0.016 (0.021)
Inheritance matrilineal and matrilocal/neolocal	0.022 (0.014)	-0.012 (0.017)	-0.011 (0.014)	-0.023 (0.017)
Inheritance matrilineal and matrilocal/neolocal*Male respondent		0.071*** (0.018)		0.025 (0.018)
Inheritance patrilineal and patrilocal/neolocal	-0.016 (0.017)	-0.028 (0.020)	-0.041** (0.017)	-0.048** (0.020)
Inheritance patrilineal and patrilocal/neolocal*Male respondent		0.026 (0.021)		0.013 (0.020)
Inheritance do not know/other	0.003 (0.022)	0.007 (0.028)	-0.016 (0.021)	-0.003 (0.027)
Inheritance do not know/other*Male respondent		-0.012 (0.033)		-0.030 (0.034)

Basic plot/household/village controls	Yes	Yes	Yes	Yes
Observations	15,472	15,472	15,472	15,472
R-squared	0.082	0.083	0.103	0.103
<b>Tests:</b> Encroached + Encroached *Male = 0		3.48*		58.61***
Land taken + Land taken *Male = 0		5.94**		1.38
Unallocated land + Unallocated land*Estates = 0		4.21**		0.24
Estates + Unallocated land*Estates = 0		4.40**		0.01
Matrilineal+Matrilineal*Male=0		11.87***		0.01
Patrilineal+Patrilineal*Male=0		0.02		3.08*
Unknown+ Unknown *Male=0		0.04		1.47

*Note:* Basic controls at plot, household, and village level as well as district fixed effects are included throughout but not reported. Basic plot controls include land area and land topography. Basic household controls include the number of children, the number of adults, the number of old people, head's characteristics (gender, age, education, birth place, and main job), ownership of durable goods, housing conditions, the value of livestock and poultry, and the value of agricultural assets. Basic village controls include access to the all seasonal road. Robust standard errors in parentheses clustered by village. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

**Table 7: Impact of inheritance-related factors on land-related investment by smallholders**

	Planted fruit trees		Built terrace		Practices crop rotation	
Inh. matrilineal and matrilocal/neolocal	0.028** (0.013)	0.059*** (0.017)	-0.003 (0.012)	-0.003 (0.015)	-0.061*** (0.015)	-0.027 (0.017)
Inh. matrilineal and matrilocal/neolocal *Male resp.		-0.050*** (0.017)		-0.002 (0.015)		-0.058*** (0.018)
Inh. patrilineal and patrilocal/neolocal	0.021 (0.018)	0.016 (0.022)	-0.047*** (0.017)	-0.051*** (0.019)	-0.019 (0.020)	0.005 (0.022)
Inh. patrilineal and patrilocal/neolocal *Male respondent		0.006 (0.019)		0.003 (0.015)		-0.043** (0.021)
Inh. do not know/other	0.033 (0.021)	0.074** (0.029)	0.002 (0.026)	0.013 (0.031)	-0.069*** (0.023)	-0.068** (0.028)
Inh. do not know/other*Male respondent		-0.069** (0.034)		-0.011 (0.025)		0.002 (0.034)
Observations	17,154	17,154	17,154	17,154	17,154	17,154
R-squared	0.066	0.081	0.090	0.097	0.155	0.164
<b>Tests:</b> Matrilineal+Matrilineal*Male=0		0.34		0.12		22.47***
Patrilineal+Patrilineal*Male=0		1.43		7.12***		3.02*
Unknown+ Unknown *Male=0		0.03		0.00		5.21**

*Note:* Basic controls at plot, household, and village level, district fixed effects, and all variables reported in table 6 are included throughout but not reported. Basic plot controls include land area and land topography. Basic household controls include the number of children, the number of adults, the number of old people, head's characteristics (gender, age, education, birth place, and main job), ownership of durable goods, housing conditions, the value of livestock and poultry, the value of agricultural assets, and the number of extension activities attended. Basic village controls include access to the all seasonal road.

Robust standard errors in parentheses clustered by village. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.



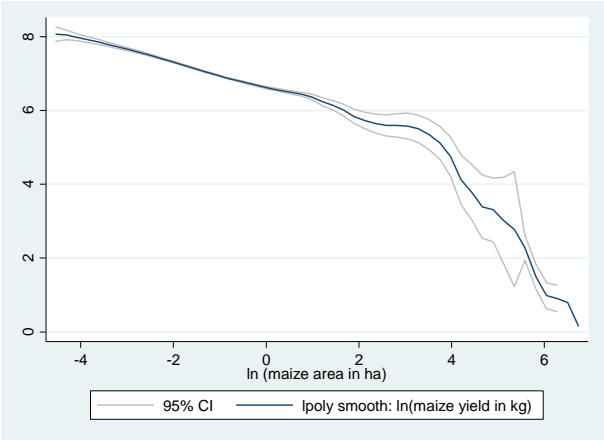
**Table 8: Impact of tenure insecurity on crop output**

	Indicator of tenure insecurity					
	Fear of land loss			Fear of encroachment		
Fear	-0.052** (0.026)	-0.119*** (0.045)	-0.122*** (0.045)	0.010 (0.026)	-0.044 (0.044)	-0.038 (0.045)
Fear*male resp.		0.105* (0.055)	0.101* (0.055)		0.090* (0.054)	0.072 (0.054)
Did crop rotation			0.112*** (0.034)			0.111*** (0.034)
Crop area	0.406*** (0.016)	0.406*** (0.016)	0.404*** (0.016)	0.407*** (0.016)	0.407*** (0.016)	0.404*** (0.016)
Manure value	0.058*** (0.012)	0.058*** (0.012)	0.057*** (0.012)	0.058*** (0.012)	0.058*** (0.012)	0.056*** (0.012)
Fertilizer value	0.120** (0.050)	0.119** (0.050)	0.120** (0.051)	0.118** (0.050)	0.118** (0.050)	0.120** (0.051)
Seed value	0.105*** (0.029)	0.104*** (0.029)	0.100*** (0.029)	0.106*** (0.029)	0.105*** (0.029)	0.101*** (0.029)
Ag. asset value	0.065*** (0.014)	0.065*** (0.014)	0.056*** (0.015)	0.065*** (0.014)	0.065*** (0.014)	0.057*** (0.014)
No. of male hh members who worked on the plot	0.017*** (0.004)	0.017*** (0.004)	0.017*** (0.004)	0.017*** (0.004)	0.017*** (0.004)	0.017*** (0.004)
No. of female members who worked on the plot	0.013*** (0.004)	0.013*** (0.004)	0.013*** (0.004)	0.013*** (0.004)	0.013*** (0.004)	0.013*** (0.004)
No. of kids who worked on the plot	0.011*** (0.003)	0.011*** (0.003)	0.011*** (0.003)	0.011*** (0.003)	0.011*** (0.003)	0.011*** (0.003)
No. of temp. employees	0.008*** (0.001)	0.008*** (0.001)	0.007*** (0.001)	0.008*** (0.001)	0.008*** (0.001)	0.007*** (0.001)
No. of members sick >= 3 months	-0.042** (0.020)	-0.041** (0.020)	-0.043** (0.021)	-0.043** (0.020)	-0.042** (0.020)	-0.044** (0.021)
Participated in exchange work	0.085*** (0.027)	0.085*** (0.027)	0.083*** (0.027)	0.084*** (0.027)	0.085*** (0.027)	0.083*** (0.027)
# of extension activities attended	0.007 (0.006)	0.007 (0.006)	0.006 (0.007)	0.007 (0.006)	0.007 (0.006)	0.007 (0.007)
Inh. matrilineal and matrilocal/neolocal	0.054 (0.041)	0.053 (0.041)	0.060 (0.056)	0.055 (0.041)	0.055 (0.041)	0.062 (0.056)
Inh. matrilineal and matrilocal/neolocal*Male resp.			-0.000 (0.058)			-0.000 (0.058)
Inh. patrilineal and patrilocal/neolocal	-0.162*** (0.059)	-0.162*** (0.059)	-0.108 (0.076)	-0.159*** (0.059)	-0.159*** (0.059)	-0.105 (0.077)
Inh. patrilineal and patrilocal/neolocal*Male resp.			-0.085 (0.072)			-0.086 (0.072)
Inh. do not know/other	0.021 (0.066)	0.022 (0.066)	0.061 (0.102)	0.022 (0.067)	0.022 (0.067)	0.058 (0.102)
Inh. do not know/other*Male resp.			-0.048 (0.122)			-0.041 (0.121)
Basic controls	Yes	Yes	Yes	Yes	Yes	Yes
Determinants of tenure insecurity	No	No	Yes	No	No	Yes
Observations	7,601	7,601	7,601	7,601	7,601	7,601
R-squared	0.413	0.414	0.420	0.413	0.413	0.419
<b>Tests:</b> Fear + Fear*Male=0		0.21	0.45		2.02	1.01
Matrilineal+Matrilineal*Male=0			1.83			1.92
Patrilineal+Patrilineal*Male=0			9.73***			9.43***
Unknown+ Unknown*Male=0			0.03			0.04

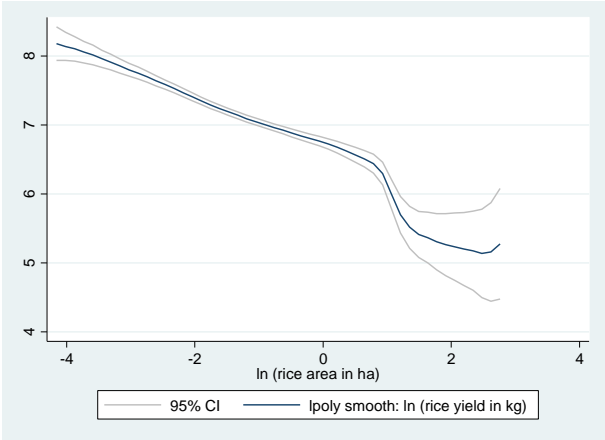
*Note:* Dependent variable is logarithm of output value. Basic controls at plot, household, and village level as well as district fixed effects are included throughout but not reported. Basic controls include topography and terracing at plot, number of children, adults, and old people in the household, head's characteristics (gender, age, education, birth place, main job), asset & livestock ownership, housing conditions at household; and indicator variables for access to all season road at village level. Determinant of tenure insecurity include the variables reported in table 6.

Robust standard errors in parentheses clustered by village. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

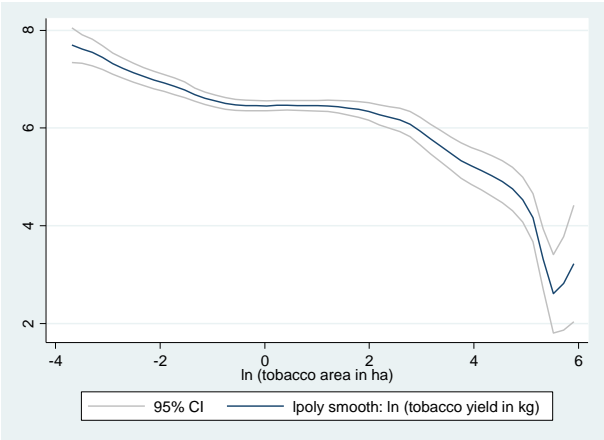
**Figure1: Non-parametric regressions of yield vs. size of cultivated area for maize, rice, tobacco, and coffee**



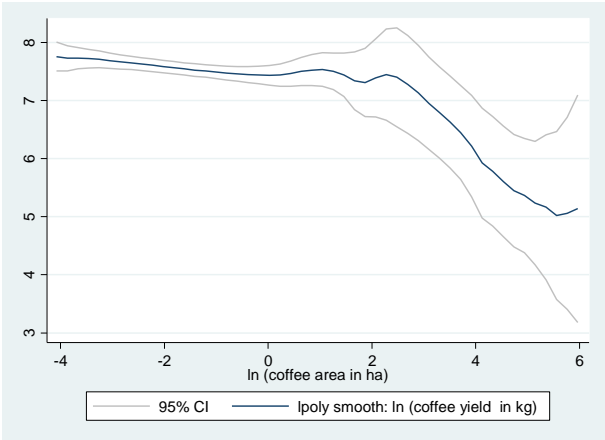
**Figure 1a: Maize**



**Figure 1b: Rice**



**Figure 1c: Tobacco**



**Figure 1d: Coffee**

## Endnotes

## References:

- Abeyasekera, S. 1997. "Developing a Sampling Strategy for the Estate Land Utilisation Study in Malawi." University of Reading.
- Ali, D., K. Deininger and M. Duponchel. 2016a. "Using Administrative Data to Assess Impact and Sustainability of Rwanda's Land Tenure Regularization." *World Bank Policy Research Paper 7705*, Washington DC.
- Ali, D. A., K. Deininger and M. Goldstein. 2014a. "Environmental and Gender Impacts of Land Tenure Regularization in Africa: Pilot Evidence from Rwanda." *Journal of Development Economics*, **110**(0), 262-275.
- Ali, D. A., K. Deininger, M. Goldstein and E. La Ferrara. 2014b. "Determinants of Participation and Transaction Cost in Rwanda's Land Markets ", *World Bank Policy Research Paper*, Washington, DC.
- Ali, D. A., K. Deininger and A. Harris. 2015. "Using National Statistics to Increase Transparency of Large Land Acquisition: Evidence from Ethiopia." *Policy Research Working Paper 7342*, Washington DC.
- Ali, D. A., et al. 2016b. "Small Price Incentives Increase Women's Access to Land Titles in Tanzania." *Journal of Development Economics*, forthcoming.
- Ali, D. A., K. W. Deininger and C. A. P. Harris. 2016c. "Large Farm Establishment, Smallholder Productivity, Labor Market Participation, and Resilience: Evidence from Ethiopia." *Policy Research Working Paper 7576*, World Bank, Washington DC.
- Atwood, D. A. 1990. "Land Registration in Africa: The Impact on Agricultural Production." *World Development*, **18**(5), 659-671.
- Berge, E., D. Kambewa, A. Munthali and H. Wiig. 2014. "Lineage and Land Reforms in Malawi: Do Matrilineal and Patrilineal Landholding Systems Represent a Problem for Land Reforms in Malawi?" *Land Use Policy*, **41**, 61-69.
- Berry, S. 2009. "Building for the Future? Investment, Land Reform and the Contingencies of Ownership in Contemporary Ghana." *World Development*, **37**(8), 1370-1378.
- Bhaumik, S. K., R. Dimova and I. N. Gang. 2016. "Is Women's Ownership of Land a Panacea in Developing Countries? Evidence from Land-Own Farm Households in Malawi." *Journal of Development Studies*, **52**(2), 242-253.
- Binswanger, H. P., K. Deininger and G. Feder. 1995. "Power, Distortions, Revolt and Reform in Agricultural Land Relations." *Handbook of development economics*, **3B**, 2659-2772.
- Bruce, J. W. and S. E. Migot-Adholla. 1994. *Searching for Land Tenure Security in Africa*. Kendall/Hunt Publishers, Dubuque, IA.
- Chinsinga, B. 2011. "The Politics of Land Reforms in Malawi: The Case of the Community Based Rural Land Development Programme (Cbrldp)." *Journal of International Development*, **23**(3), 380-393.
- Chinsinga, B. and C. Poulton. 2014. "Beyond Technocratic Debates: The Significance and Transience of Political Incentives in the Malawi Farm Input Subsidy Programme (Fisp)." **32**, s123-s150.
- Deininger, K. and R. Castagnini. 2006. "Incidence and Impact of Land Conflict in Uganda." *Journal of Economic Behavior & Organization*, **60**(3), 321-345.
- Deininger, K. and S. Jin. 2006. "Tenure Security and Land-Related Investment: Evidence from Ethiopia." *European Economic Review*, **50**(5), 1245-1277.
- Deininger, K., F. Xia and S. Savastano. 2015. "Smallholders' Land Ownership and Access in Sub-Saharan Africa: A New Landscape?", *Policy Research Working Paper 7285*, Washington DC.
- Devereux, S. 1997. "Household Food Security in Malawi ", *Discussion Paper 362*, Institute for Development Studies, Brighton.
- Dimova, R., S. Gangopadhyay, K. Michaelowa and A. Weber. 2015. "Off-Farm Labor Supply and Correlated Shocks: New Theoretical Insights and Evidence from Malawi." *Economic Development and Cultural Change*, **63**(2), 361-391.
- Eck, K. 2014. "The Law of the Land: Communal Conflict and Legal Authority." *Journal of Peace Research*, **51**(4), 441-454.
- Fenske, J. 2010. "L'etranger: Status, Property Rights, and Investment Incentives in Cote D'ivoire." *Land Economics*, **86**(4), 621-644.
- Fenske, J. 2011. "Land Tenure and Investment Incentives: Evidence from West Africa." *Journal of Development Economics*, **95**(1), 137-156.
- Goldstein, M. and C. Udry. 2006. "The Profits of Power: Land Rights and Agricultural Investment in Ghana." *Economic Growth Center Working Paper 929*, New Haven, CT.
- Goldstein, M. and C. Udry. 2008. "The Profits of Power: Land Rights and Agricultural Investment in Ghana." *Journal of Political Economy*, **116**(6), 980-1022.
- Gossage, S. J. 1997. *Land Use on the Tobacco Estates of Malawi: Report of the Land Use Survey of Tobacco Estates in Malawi, 1996*. Government of Malawi and Overseas Development Institute, Lilongwe.
- Harttgen, K., S. Klasen and R. Rischke. 2016. "Analyzing Nutritional Impacts of Price and Income Related Shocks in Malawi: Simulating Household Entitlements to Food." *Food Policy*, **60**, 31-43.
- Holden, S., R. Kaarhus and R. Lunduka. 2006. "Land Policy Reform: The Role of Land Markets and Women's Land Rights in Malawi." *Noragric Report No. 36*, Norwegian University of Life Sciences, Aas, Norway.
- Holden, S. T., K. Deininger and H. Ghebru. 2011. "Tenure Insecurity, Gender, Low-Cost Land Certification and Land Rental Market Participation in Ethiopia." *Journal of Development Studies*, **47**(1), 31-47.
- Hyder, A., J. R. Behrman and H.-P. Kohler. 2015. "Negative Economic Shocks and Child Schooling: Evidence from Rural Malawi." *Development Southern Africa*, **32**(4), 458-476.
- Jaffee, S. M. 2003. "Malawi's Tobacco Sector: Standing on One Strong Leg Is Better Than on None ", *Africa Region Working Paper Series No. 55* World Bank, East & Southern Africa Agricultural Division, Washington DC.
- Jayne, T. S., et al. 2015. "Africa's Changing Farmland Ownership: Causes and Consequences ", *Paper Presented at the joint AAEA & WAEA Annual meeting*, San Francisco, CA.

Jul-Larsen, E. and P. Mvula. 2007. "Security for Many or Surplus for the Few? Customary Tenure and Social Differentiation in Southern Malawi." *CMI Working paper 2007:9*, Christoph Michelsen Institute, Bergen.

Kaarhus, R. and S. Dondeyne. 2015. "Formalising Land Rights Based on Customary Tenure: Community Delimitation and Women's Access to Land in Central Mozambique." *The Journal of Modern African Studies*, **53**(02), 193-216.

Kydd, J. and R. Christiansen. 1982. "Structural Change in Malawi since Independence: Consequences of a Development Strategy Based on Large-Scale Agriculture." *World Development*, **10**(5), 355-375.

Lawry, S., et al. 2016. "The Impact of Land Property Rights Interventions on Investment and Agricultural Productivity in Developing Countries: A Systematic Review." *Journal of Development Effectiveness*, 1-21.

Lea, N. and L. Hanmer. 2009. "Constraints to Growth in Malawi." The World Bank, Policy Research Working Paper Series: 5097.

Lewin, P. A., M. Fisher and B. Weber. 2012. "Do Rainfall Conditions Push or Pull Rural Migrants: Evidence from Malawi." *Agricultural Economics*, **43**(2), 191-204.

Linkow, B. 2016. "Causes and Consequences of Perceived Land Tenure Insecurity: Survey Evidence from Burkina Faso." *Land Economics*, **92**(2), 308-327.

Lovo, S. 2016. "Tenure Insecurity and Investment in Soil Conservation. Evidence from Malawi." *World Development*, **78**, 219-229.

Lunduka, R. 2009. "Land Rental Markets, Investment and Productivity under Customary Land Tenure Systems in Malawi." *PhD Thesis*, Norwegian University of Life Sciences, Aas.

Lunduka, R., S. T. Holden and R. Oygard. 2009. "Land Rental Market Participation and Tenure Security in Malawi." in S. T. Holden, et al. (eds.), *The Emergence of Land Markets in Africa: Assessing the Impacts on Poverty, Equity, and Efficiency*, Washington, D.C.: Resources for the Future.

Mandondo, A. and L. German. 2015. "Customary Rights and Societal Stakes of Large-Scale Tobacco Cultivation in Malawi." *Agriculture and Human Values*, **32**(1), 31-46.

Mataya, C. S. and E. W. Tsonga. 2001. "Economic Aspects of Development of Agricultural Alternatives to Tobacco Production and Export Marketing in Malawi " in UNCTAD (ed.), *Analytical Studies on Trade, Environment and Development*, United Nations Conference on Trade and Development, New York and Geneva.

Mueller, V., A. Quisumbing, H. L. Lee and K. Droppelmann. 2014. "Resettlement for Food Security's Sake: Insights from a Malawi Land Reform Project." *Land Economics*, **90**(2), 222-236.

Nagler, P. and W. Naude. 2014. "Non-Farm Enterprises in Rural Africa: New Empirical Evidence." The World Bank, Policy Research Working Paper Series: 7066.

Newman, C., F. Tarp and K. van den Broeck. 2015. "Property Rights and Productivity: The Case of Joint Land Titling in Vietnam." *91*(1), 91-105.

Nkurunziza, E. 2015. "Implementing and Sustaining Land Tenure Regularization in Rwanda." in T. Hilhorst and F. Meunier (eds.), *How Innovations in Land Administration Reform Improve on Doing Business*, World Bank, Washington DC.

Peters, P. 2007. "Whose Security? Deepening Social Conflict over 'Customary' Land in the Shadow of Land Tenure Reform in Malawi." *Journal of Modern African Studies*, **45**(3), 447-472.

Peters, P. E. 2010. "'Our Daughters Inherit Our Land, but Our Sons Use Their Wives' Fields': Matrilineal-Matrilocal Land Tenure and the New Land Policy in Malawi." *Journal of Eastern African Studies*, **4**(1), 179-199.

Pinckney, T. C. and P. K. Kimuyu. 1994. "Land Tenure Reform in East Africa: Good, Bad or Unimportant?" *Journal of African Economies*, **3**(1), 1-28.

Place, F. and K. Otsuka. 2001. "Tenure, Agricultural Investment, and Productivity in the Customary Tenure Sector of Malawi." *Economic Development and Cultural Change*, **50**(1), 77-99.

Ricker-Gilbert, J., C. Jumbe and J. Chamberlin. 2014. "How Does Population Density Influence Agricultural Intensification and Productivity? Evidence from Malawi." *Food Policy*, **48**, 114-128.

Saidi, P. M. 1999. "Final Report of the Presidential Commission of Inquiry on Land Policy Reform.", Government of Malawi, Lilongwe.

Sassi, M. 2015. "Seasonality and Trends in Child Malnutrition: Time-Series Analysis of Health Clinic Data from the Dowa District of Malawi." *Journal of Development Studies*, **51**(12), 1667-1682.

Sitko, N. J., J. Chamberlin and M. Hichaambwa. 2014. "Does Smallholder Land Titling Facilitate Agricultural Growth?: An Analysis of the Determinants and Effects of Smallholder Land Titling in Zambia." *World Development*, **64**, 791-802.

Takane, T. 2008. "Customary Land Tenure, Inheritance Rules, and Smallholder Farmers in Malawi\*." *Journal of Southern African Studies*, **34**(2), 269-291.

Telalagic, S. 2012. "Domestic Production as a Source of Marital Power: Theory and Evidence from Malawi." Faculty of Economics, University of Cambridge, Cambridge Working Papers in Economics.

Telalagic, S. 2014. "Kinship and Consumption: The Effect of Spouses' Outside Options on Household Productivity." University of Oxford, Department of Economics, Economics Series Working Papers: 720.

Udry, C. 1996. "Gender, Agricultural Production, and the Theory of the Household." *Journal of Political Economy*, **104**(5), 1010-1046.

van Donge, J. K. 1999. "Law and Order as a Development Issue: Land Conflicts and the Creation of Social Order in Southern Malawi." *Journal of Development Studies*, **36**(2), 48-70.