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Land inheritance and youth employment and migration decisions: evidence from rural Ethiopia

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ABSTRACT

How does the amount of land youth expect to inherit affect their migration and em- ployment decisions? We explore this question in the context of rural Ethiopia using panel data from 2010 and 2014. We estimate a household fixed effects model and ex- ploit exogenous variation in the timing of land redistributions to overcome endogenous household decisions about how much land to bequeath to descendants. We find that larger expected land inheritances significantly lower the likelihood of long-distance permanent migration and of permanent migration to urban areas during this time. Inheriting more land is also associated with a significantly higher likelihood of em- ployment in agriculture and a lower likelihood of employment in the non-agricultural sector. Conversely, the decision to study is unaffected. These results are most heavily driven by males and by the older half of our youth sample. We also find that several mediating factors matter. Land inheritance plays a much more pronounced role in pre- dicting rural-to-urban permanent migration and non-agricultural sector employment in areas with less-vibrant land markets and in relatively remote areas (far from major urban centers). Overall, the results suggest that inheritance strongly influences the spatial location and strategic employment decisions of youth.

Keywords: Agriculture, employment, land inheritance, migration, youth

It's the youth bulge that stands to put greater pressure on the global economy, sow political unrest, spur mass migration and have profound consequences for everything from marriage to Internet access to the growth of cities (Sengupta, 2015).

PAPER

1. Introduction

How does the amount of land youth expect to inherit affect their migration and employ- ment decisions? In rural Africa, youth typically rely on inheritance (or on small land rental markets) to access parcels under usufruct land rights systems[1]. However, popula- tion pressures—including a youth bulge in many developing countries—are reducing land availability (Jayne et al., 2010; Muyanga and Jayne, 2014) and potentially opportunities for youth to work in agriculture. Further, as farms intensify agricultural production to overcome land constraints (Ali and Deininger, 2015; Barrett et al., 2010; Bellemare, 2013; Carletto et al., 2013; Headey et al., 2014; Larson et al., 2014; Sheahan and Barrett, 2014), labor saving technologies may consequentially substitute youth farm labor (Bustos et al.,

2016). Pessimistic views on inheritance prospects may push some youth to delay entering the labor force by seeking a secondary or tertiary education. Alternatively, youth may be en- couraged to transition from low-return agricultural to high-return non-agricultural activities (Bezu and Barrett, 2012; Nagler and Naude, 2014). Understanding how land inheritance size impacts youths' subsequent migration and employment decisions is thus critical for understanding the likely impacts of these artifacts of development.

Our main objective is to examine if perceptions of land inheritance prospects (as a proxy for individual land access) affect youth migration and employment decisions in the context of rural Ethiopia. We use a unique dataset on all descendants (children and other close relatives, living in or out of the home, who might stand to inherit land) of household heads and their spouses in 27 woredas (districts) of the Amhara and Oromia regions of Ethiopia.

Our analysis utilizes a measure of individual expected land inheritance based on detailed information provided by household heads on inheritances granted and expected to be granted to each of their descendants. As in Bezu and Holden (2014), we analyze multiple youth employment outcomes simultaneously (permanent migration, long-distance permanent migration, rural- to-urban permanent migration, agricultural employment, non-agricultural employment, and propensity to seek education)

[1] We adopt the World Bank definition of youth employment, encompassing individuals between ages 15 and 34 (Filmer et al., 2014).

to understand whether land constraints drive human capital investment and transitions into potentially high-return occupations. We consider how these relationships vary with gender and youth age. Lastly, we examine the role of mediating factors, to inform policy: the quality of land rental markets and travel time to a major urban center. Such factors may influence the costs of migration, opportunity costs, and barriers into non-agricultural labor.

One of the main empirical challenges confronting analysis of this question is the endo- geneity of individual land inheritance. The size of youth land inheritances is likely shaped by numerous factors unobservable to the econometrician yet correlated with individual labor activities. We estimate a household fixed effects model and appeal to historical land reforms in Ethiopia to develop an instrumental variable for expected individual land inheritance. Specifically, since the installation of Ethiopia's current government in 1991 following the col- lapse of the communist "Derg" dictatorship, 20 of our 27 sample woredas have experienced a large-scale land redistribution. Under such redistributions, the local government allocates land to households based on household size at the time (with particular attention to adult males), with variation over space and time. Using a complete list of descendants of the head and their spouse, provided by the head, and using kebele (or sub-district) official surveys to identify the most recent year of redistribution, we construct an instrumental variable for individual expected inheritance. This instrument is the share of an individual's male co-descendants that were at least 18 years old at the time of the redistribution, interacted with a dummy for having more than one male descendant immediately below one's self in the birth order. This interaction flexibly allows the impact of having a greater share of male descendants be over age 18 at the time of the redistribution to vary according to whether or not the head will face pressures to provide multiple male inheritances immediately after providing an inheritance to a given descendant. Allowing for this is important given that males in our dataset tend to receive larger inheritances than do females (about 60 percent larger, at the median)[2]. Any given youth has a greater likelihood of inheriting land if he has a higher proportion of his male co-descendants aged 18 or higher prior to the redistribution, but the impact should be especially large for youth faced with an acute threat to the size of their inheritance: multiple males immediately following them in the birth order. We show that this instrument is strong, and in a placebo analysis we demonstrate that its strength quickly deteriorates if we use any year other than the actual year of redistribution.

We find that larger expected land inheritances significantly lower the likelihood of long- distance permanent migration and of rural-to-urban permanent migration during this time, despite overall null impacts on permanent migration. Inheriting more land does not signif- icantly reduce permanent migration, but it leads permanent migrants to form households nearby rather than in other districts or urban areas. Inheriting more land is also associated with a significantly higher likelihood of employment in agriculture and a lower likelihood of employment in the non-agricultural sector. Conversely, the decision to study is not robustly impacted by one's expected land inheritance.

These effects are largely driven by men; inheriting more land does not significantly im- pact the migration of women. Further, while inheriting more land predicts significantly greater employment in agriculture and lower employment in the non-agricultural sector for men, the impacts are significantly smaller in magnitude and—in the case of non-agricultural employment—statistically insignificant for women. Impacts on long-distance permanent mi- gration and employment in the non-agricultural sector are also significantly larger for youth aged 20–34 (above median for the sample) than for those in the 15–19 age range, reflecting that it is somewhat older youth whose migration and employment decisions are most heavily influenced by the size of their land inheritance. This may be driven by older youth being closer to the time of inheritance, or, for men in particular, closer to the timing of establishing financial independence and marital arrangements (Honwana, 2012). Land inheritance plays a much more pronounced role in predicting rural-to-urban permanent migration and non- agricultural sector employment in areas with less-vibrant land markets than in areas with more vibrant markets. Similarly, it is in relatively remote places (far from a major urban center) that the amount of land inheritance is most important for migration and employment decisions. This suggests the importance of context in studying the effects of inheritance.

Overall, the results suggest that inheritance strongly influences the spatial location and strategic employment decisions of youth. Youth have a strong tendency to remain in the agricultural sector if given the opportunity to access land, and they pursue non-agricultural labor opportunities in large part as a response to land shortages.

The paper is organized as follows. Section 2 presents our overarching conceptual frame- work, reviewing existing literature and the knowledge gaps that our paper seeks to address. Section 3 outlines access to land in Ethiopia, the norms that governance inheritance of land in Ethiopia, and the current state—and related drivers—of migration and youth employ- ment in rural Ethiopia. Section 4 outlines our primary data source and how we measure inheritance, migration, and employment outcomes. Section 5 outlines our empirical strategy, including our main econometric specification and identification strategy. Section 6 presents our main results as well as result by gender, age, depth of

[2] This is despite legal provisions in our study regions stating that women have equal rights as men to access, use, and manage land (ANRS, 2006, 2007; ONRS, 2007).

land rental markets, and proximity to a major urban center. Finally, Section 7 concludes.

2. Conceptual Framework

There are two formative complementary or substitutionary relationships between factor in- puts (labor, land capital, and non-land capital) in agricultural production that influence the demand for youth labor. The first is the complementarity between land and family labor.

These relationships can be quite complex in sub-Saharan Africa (SSA), depending on land and labor constraints (Headey et al., 2014). Consider the case where land is constrained as in Ethiopia, but labor and land are perfect complements. If the household has excess labor, then the demand for youth farm employment will be relatively low. However, the relationship between labor and non-land capital is another integral determinant of labor demand in this case. The adoption of labor-intensive technologies would shift upward the demand for youth labor. This is what one might expect to occur in SSA, given smallholder farmers' intensification of fertilizer use, high yield varieties, and other input-intensive prac- tices to increase production (Barrett et al., 2010; Headey et al., 2014; Headey and Jayne, 2014; Larson et al., 2014; Muyanga and Jayne, 2014; Sheahan and Barrett, 2014). Else- where, farmers have shifted their adoption toward labor saving technologies, causing an exodus of labor from the agricultural sector (Bustos et al., 2016).

Of course, the presence of local non-agricultural employment and income opportuni- ties may draw youth out of agriculture (de Brauw and Mueller, 2012). Opportunity costs of working on the family farm put pressure on youth employment decisions. Recent work suggests the opportunity costs posed by the agricultural wage (Dillon and Barrett, 2014) and non-agricultural self-employment sectors may be low (Bezu and Barrett, 2012; Nagler and Naude, 2014), the latter being driven by high barriers to youth starting their own non-agricultural enterprises. Thus, among households with rudimentary production technologies or excess labor, youth may be pushed to take advantage of the monetary re- turns to migration, traveling to destinations with higher wages (de Brauw et al., 2013a).

Existing literature has not come to firm conclusions about the impacts of land access on subsequent youth migration and employment decisions. An important recent study links individual access to land with youth aspirations of exiting the agricultural sector in southern Ethiopia (Bezu and Holden, 2014). The authors find robust negative relationships between farm size per child and off-farm employment, with weaker evidence on migration. But esti- mated effects of land access on migration and off-farm employment may be attenuated by at least two factors. First, using the ratio between farm size and children of the household head may result in a biased measure of individual inheritance. Eligible candidates for inherited land include migrant children of the head and spouse, as well as extended family members (Holden and Bezabih, 2008). Second, even a measure of lagged household farm size may fail to account for land transfers that occurred prior to the initial interview. If an individual's expectation of additional land inheritance in the future is negatively correlated with what they received prior to the initial interview, and pre-initial interview transfers increase migra- tion and non-agricultural employment, then estimates of the impacts of expected individual inheritance in the future on migration and employment may be downward biased. This mo- tivates our analysis of the impacts of land access that takes into account the full history of descendants of the household head or their spouse—regardless of whether or not they still live at home—and which further takes into account all inheritances already granted as well as those expected to be granted in the future.

We also account for how recent developments in migrant labor and land rental markets might influence youth employment-land relationships. First, we examine how expected land inheritance differentially predicts employment decisions depending on whether the individual is in close proximity of a major urban center. The expected returns to migrant labor will be higher if moving costs are lower—either due to proximity or due to knowledge of the local language increasing the probability of securing employment at destination (Sjaastad, 1962). Yet, the wage gap between one's origin and destination may be much smaller in areas close to cities, reducing youth migration (Harris and Todaro, 1970). A less pronounced inverse relationship between access to land and youth migration (push factor) may thus be observed in areas closer to towns due to these countervailing effects. This is an empirical question meriting analysis. Second, we consider whether the presence of more robust local land rental markets reduces youth tendencies to migrate or work in the non-agricultural sector. Local rental markets provide youth opportunities to establish their own farms outside of inheritance. For this reason, youth are one of the most prominent groups engaging in these markets in SSA (Deininger et al., 2015). In areas with robust rental markets, youth migration and employment decisions may be less responsive to expectations on inherited land. Although rental markets provide youth access to land, we do not expect the presence of rental markets to perfectly offset responses we might observe between expected land inheritance and employment; there is likely a premium to having ownership or longer-term usage rights to the land youth cultivate. This premium may be due in part to inheritance conferring more secure property rights than does rental.

3. Background and Context

3.1 Access to land in Ethiopia

Ethiopia has long faced severe problems of land scarcity. Population density is growing rapidly, leading

average household farm sizes to dwindle. In 2011–12, more than half of the rural farm households in Ethiopia cultivated less than one hectare of land (CSA, 2012). Further, a youth bulge in Africa[3] promises to intensify these problems for youth in partic- ular (CSA, 2015). In such land-constrained countries under usufruct land rights systems, like Ethiopia, youth rely on periodic land redistributions, inheritance, and/or small rental markets for any access to land.

The communist "Derg" dictatorship ruled Ethiopia from 1974–1987; land was formally owned by the government, which aimed to maintain social equity by ensuring at least some degree of equality in household access to land. The current regime has been in place since 1991, following the collapse of the Derg dictatorship. Land continues to be formally owned by the government, with formal land markets (sales) outlawed. However, several land redis- tributions have occurred since 1991, usually based on household size at the time (with extra weight placed on adult males). In our study regions of Amhara and Oromia, 20 of our 27 sample woredas experienced such a land redistribution, though there is substantial variation in the timing of the redistributions, as shown in Table 1[4]. The median year of redistribution is 2003, but these range in time from 1992 to 2013. Post-Derg era land redistributions have mostly involved land which had been previously utilized by state farms (Bruce et al., 1994)[5].

Individual land users in our study regions have the legal right to transfer their land use rights to their children or other family members (ANRS, 2006, 2007; ONRS, 2007). Individuals also have the right to rent their land use rights to any person—with some region- specific restrictions on size and duration of the land transactions[6]. Land inheritances in Ethiopia are not uniform across descendants of the head—both due to cultural factors like norms associated with gender and age and due to restrictions on land fragmentation[7].

3.2 Norms of Inheritance

Although statutory land tenure and inheritance laws in Ethiopia allow all rural citizens wishing to engage in agriculture to access land, customary norms and practices tend to favor men (Fafchamps and Quisumbing, 2005)[8]. First, marriage is primarily patrilocal whereby the wife resides with or near the husband's parents. Second, sons (especially the first born) traditionally care for their parents in old age (Kumar and Quisumbing, 2012). Finally, cus- tomary beliefs limit the type of agricultural labor in which females can engage (plowing, sowing seeds and threshing are exclusively male activities), necessitating male labor partici- pation on any plot.

Existing research has explored sibling competition and its effects on parental and youth decision-making in a variety of contexts[9]. Fafchamps and Quisumbing (2005) suggest that a groom's number of brothers (but not sisters) has a strong negative effect on land inheritance at marriage. Gibson and Gurmu (2011) find that having a greater number of elder brothers decreases a sibling's agricultural productivity (younger male siblings receive less productive land) and diminishes marriage opportunities (via less assets brought to the marriage).

Finally, previous research contends that not only older brothers, but also younger sib- lings may affect a youth's decision to seek an alternative livelihood outside of agriculture. Gibson and Gurmu (2012) analyzed sibling out-migration in a district of Ethiopia close to the capital of Addis Ababa (in Oromia region) and found that the birth of a younger sibling doubled the odds of out-migration over time. The primary reason for migration was to seek high school education or non-agricultural employment opportunities.

3.3 Migration and employment in rural Ethiopia

Recent analysis of migration in Ethiopia suggests that migrants are predominantly 'pushed' from their homes rather than attracted by an urban 'pull' of higher returns on human capital investments. For example, the Ethiopian Urban Migration Study (World Bank, 2010) reports that more than 42 percent

[3] As of 2015, 37 percent of the population of Ethiopia was between the ages of 15 and 34 (CSA, 2015).

[4] In the survey, we asked about the latest redistribution so as to ensure that respondents recall the period of redistribution post-Derg dictatorship.

[5] While communal grazing land and woodland continues to be distributed to new claimants as need arises, such reallocations are not nearly at the scale of the land redistributions that occurred during the post-Derg era (Demeke, 1999).

[6] For example, while the restrictions are more relaxed in Amhara, the Oromia land proclamation decrees that individuals have the right to rent out only up to half of their total land holding, limiting the duration of the land rental to a maximum of 3 years for those who employ traditional farming and 15 years for modern/mechanized farming (ONRS, 2007).

[7] Farm fragmentation is a key challenge in Ethiopia—partly induced by intra-household land transfers over the last 20–25 years. In response, many regions (including our study regions) have introduced restrictive regulations regarding the size of a plot. Oromia land law sets a floor size per plot of 0.5 hectares for annual crops and 0.25 hectares for perennial crops (ONRS, 2007), while the minimum plot size in Amhara is 0.25 and 0.11 hectares for plots under rain-fed agriculture and irrigation, respectively (ANRS, 2006, 2007).

[8] For further discussion of customary law and inheritance, see North (1990), Fafchamps and Quisumbing (2002), and Mekonnen and Worku (2011).

[9] See, for example, research on sibling composition and rivalry on: health outcomes (Kumar and Quisumbing, 2012; Mekonnen and Worku, 2011; Kushnick, 2010; Garg and Morduch, 1998; Morduch, 2000), education outcomes (Congdon Fors et al., 2015; Gibson and Sear, 2010; Lloyd et al., 2009; Butcher and Case, 1994), and inheritable wealth (Grawe, 2010; Keister, 2003).

of migrants stated that they would not have migrated if they would have been able to make a living in their original home. Zeleke et al. (2008) reports that young men are the most likely to migrate in Amhara region and respondents cite a lack of sufficient means of subsistence, shortage of land, and shortage of employment opportunities in the rural areas as primary reasons for migrating. Likewise, Dorosh et al. (2012) find that households with less agricultural land were more likely to send out migrants, as were poorer households and households afflicted by a community-wide drought shock. Similar relationships between migration and land are reported in de Brauw (2014) and Lee and Mueller (2016).

According to the National Labor Force Survey in 2013 (NLFS), rural-rural and rural- urban migration shares are almost equivalent at 35 and 33 percent respectively of total migrants (authors' calculations using NLFS, 2013). Of course, there is substantial regional variation in these numbers, with greater rural-rural migration in Amhara, Oromiya and SNNP regions than in Tigray, for example[10].

Although migration in Ethiopia occurs for a variety of reasons (education, risk insurance, employment diversification), research on non-agricultural labor activities suggests that there are few opportunities for rural laborers to obtain employment outside of agriculture. Among rural-urban migrants aged 15–65, only 35.5 percent are motivated to migrate in search of work (Mueller et al., 2015). Education is the strongest determinant of rural-urban migration (de Brauw et al., 2013b; Mueller et al., 2015), following large national education investments during the last decade of about 4 percent of GDP (World Bank, 2016).

Schmidt and Bekele (2016) use the NLFS 2013 to show that only 23 percent of the economically active population identifies their primary occupation as being in the non- agricultural sector. Among non-agricultural sector workers, the largest share (30 percent) is engaged in sales work, of which street vendors and local market sales comprise 42 percent. Informal alcohol vendors make up another 20 percent of sales work, while formal shopkeepers comprise 22 percent. The majority of the remaining non-agricultural laborers are divided among construction and mining (11 percent), food processing and craftwork (8 percent), teaching (6 percent), and a variety of other jobs such as refuse and personal service work- ers. These are by and large low-skilled occupations with limited labor demand, possibly explaining why youth are often pushed rather than pulled into them.

Both employment diversification (via non-agricultural employment and/or migration) and the pursuit of educational opportunities represent potential strategies of risk diversifica- tion. A variety of factors including sibling competition for inheritable assets like agricultural plots, agricultural shocks (e.g., droughts or floods), and declining agricultural productivity may lead youth to pursue these strategies. Given that agricultural land in Ethiopia is predominantly accessed via inheritance or share-cropping[11], we hypothesize that access to land (via inheritance) affects youth decisions to stay in agriculture or seek other livelihood opportunities. We explore this hypothesis using a unique panel dataset that collects data over a variety of agro-ecological zones and farming systems.

4. Data

Ethiopia provides an ideal environment in which to examine how access to land affects individuals' decisions to diversify out of agriculture for several reasons. First, it is a pri- marily agrarian economy where land is accordingly central to livelihoods—as in much of the developing world. Second, geographic and topographic characteristics, as well as farm- ing systems and the value of farming, differ significantly over short distances—providing useful variation in our explanatory variables. Finally, land tenure policies and inheritance customs, described in Section 3, provide a natural experiment for understanding the effects of sibling (and co-descendant) configuration on land inheritance perceptions and ultimately employment diversification choices.

We take advantage of a panel survey conducted in 2010 (round 1) and 2014 (round 2)[12]. Round 2 was purposefully designed to address the research questions outlined above; it collects detailed information on not only household members (that live in the household and comprise the household roster), but also direct descendants of the household head or their spouse that are non-resident. This permits us to analyze the expected inheritances as well as the migration and employment decisions of all descendants.

The round 1 survey encompassed 1,810 households and was completed in July 2010 in order to evaluate the impact of the Sustainable Land Management Program (SLMP) in Amhara and Oromia regions. The sample was drawn from a list of kebeles (sub-districts) within the Blue Nile Basin in Amhara and Oromia[13]. The final sample consisted of 27 kebeles located in 9 woredas, with approximately 200

[10] de Brauw and Mueller (2012) also note differences in regional migration trends, findings that greater land transferability is associated with decreased migration.

[11] Although sharecropping provides access to agricultural land, tenuous contracts require sharecroppers to continuously change contracts and work different agricultural plots (see Deininger et al. (2003, 2011)).

[12] Both rounds were conducted by the International Food Policy Research Institute (IFPRI) in collaboration with the Ethiopian Development Research Institute (EDRI).

[13] Based on the list of SLMP kebeles in Amhara and Oromia, a random sample of woredas (districts) were selected whereby a woreda must contain one SLMP kebele.

households surveyed per woreda[14]. In round 2, 1,748 of the households interviewed in round 1 were located and interviewed again, representing a household attrition rate of 3.4 percent over 4 years.

Our analysis uses a cross-sectional dataset. We include in our estimation sample all direct descendants of the household head[15] or their spouse who lived in the household in round 1. Our dataset records whether or not they left the household (permanently migrated) by round 2, and their sector of employment in round 2. We describe our specific measures in Section 4.1. Our controls are from round 1 to reduce concerns of reverse causality.

4.1 Variable Measurement

We measure youths' expected land inheritance by asking heads about each of their direct descendants: how much land they have already received[16] and how much land they expect to provide in the future. Summing the two gives the total expected inheritance. This is a meaningful quantity as heads are generally the prime decision-maker over inheritances. In the text, we refer to individuals' expected land inheritance; in all cases this should be understood as the sum of what they have inherited and what the head expects to provide.

We measure migration in three ways. First, we code a dummy variable for permanent migration that takes on a value of 1 for any youth who was a household member in 2010 but is no longer a household member by 2014. For this definition of permanent migration, individuals may have migrated anywhere in Ethiopia or elsewhere. However, they cannot simply be temporarily absent; they must no longer be considered a household member. Second, we code a dummy variable for long-distance permanent migration, which takes on a value of 1 provided that the individual permanently migrated since 2010 and by 2014 lives outside of the woreda (district) in which they resided in 2010. Finally, we code a dummy variable for permanent migration to an urban area, which takes on a value of 1 provided that the individual permanently migrated since 2010 and by 2014 lives in an urban area.

We are predominately interested in whether individuals work in the agricultural or in the non-agricultural sector. We accordingly consider two employment outcomes: agriculture is the individual's primary occupation, and the non-agricultural sector is the individual's primary occupation. We further examine whether or not the individual is currently studying as their primary occupation—indicating the choice to acquire human capital[17].

4.2 Descriptive statistics

Table 2 summarizes the outcomes, land access measures, and individual and household characteristics for the full sample as well as for the sub-sample of those who expect to inherit land (71 percent of the full sample). We focus most of the analysis on those who expect to inherit land; this encompasses the vast majority of all individuals, and is also the estimation sample driving our slope coefficients when we consider the logged value of land inheritance as our key explanatory variable. We apply a natural logarithmic transformation to reduce the tendency for extreme outliers to drive inferences in our regression analysis.

Panel A summarizes the outcomes of interest. Nearly half of individuals (45 percent) permanently migrated between survey rounds. Of those permanent migrations, nearly half were to locations outside of the woreda in which they lived in 2010 and 62 percent were to an urban area[18][19]. The primary occupation is most often in agriculture (37 percent) or in school (29 percent); but 16 percent work in the non-agricultural sector and 13 percent do domestic work. Only 4 percent of the sample reports being unemployed. The average individual expects to inherit 0.34 hectares of land (Panel B).

Panel C shows that the sample is tilted towards males (67 percent). The descendants' average age in round 1 is about 20 years, most (98 percent) are children of the head[20], 68 percent have finished the first education cycle (grades 1-4), and few (5 percent) are married. A quarter of the descendants have more than one male descendant directly following them in birth order. On average, descendants have 1.4 older male descendants and 1.2 older female descendants; 17 percent were at least 18 years old at the time of the last land redistribution. Household characteristics[21] are summarized in Panel D. While about two-thirds of households have a metal roof, only 3 percent have an improved floor. The

[14] For more information on sample selection and site location, see Schmidt and Tadesse (2014).
[15] We use the round 2 household head since data on the complete list of descendants of the head and their spouse—as well as inheritance amounts—was completed in round 2.
[16] We ask how much land they have received from either the household or the peasant association (PA).
[17] There are two other possibilities for primary occupation: domestic employee and unemployed. These are summarized in Table 2, alongside our main employment outcomes of interest.
[18] These numbers come from the following calculations: 0.21/0.45 = 0.47 and 0.28/0.45 = 0.62. Note that moving out of woreda and moving to an urban area are not mutually exclusive.
[19] Our sample implies an annual out-of-woreda (district) migration rate of 5 percent. This is slightly larger than the rate computed using 2007 Census data, 1.1 percent (Mueller et al., 2015), perhaps due to the focus on youth who have greater rates of mobility (Lee and Mueller, 2016) and increasing migration trends.
[20] The sample is restricted to direct descendants of the head or their spouse, but this can include stepchildren or grandchildren (though it rarely does).
[21] Household characteristics are not included because they are collinear with household fixed effects.

household head was, on average, 53 years old, male (83 percent) and had no education (58 percent). 71 percent were Orthodox Christians and 25 percent were Protestant.

5. Empirical Strategy

We investigate the effect of land inheritance on youths' migration and sector of primary employment decisions. If all variation in youths' expected land inheritance were exogenous to employment and migration decisions, we could recover causal estimates of the impact of expected inheritance by estimating the following linear probability model:

$$E_i = \beta_0 + \beta_1 L_i + \gamma \mathbf{X}_i + \alpha_j + \epsilon_i \quad (1)$$

where i indexes individuals. We denote by E_i migration and employment outcomes, by L_i expected land inheritance, by $\mathbf{X}_i$ a vector of control variables, described below, and by α_j household fixed effects. Standard errors are clustered at the kebele level, the relevant administrative unit in which land redistribution policies are executed.

5.1 Identification

A concern of our analysis is that the anticipated amount of land inheritance is likely to be endogenous to migration, employment, and educational decisions. There are several possible sources of omitted variable bias likely to bias ordinary least squares (OLS) estimates of β_1.

First, in a model without household fixed effects, one would worry that a household's land endowment, wealth, and income levels would heavily influence both migration and em- ployment decisions and expected inheritance. Migration is costly and requires the payment of up-front costs to finance it (Carrington et al., 1996). Further, employment in agriculture is more likely in a family with ample experience in this sector due to their own larger land en- dowments and knowledge (Bezu and Barrett, 2012). Indeed, this source of omitted variable bias is a compelling reason to include household fixed effects in all regressions; through their inclusion, our regression results use within-household variation in expected land inheritances to explain within-household variation in migration and sector of employment decisions.

Second, within a household, parents may select descendants with particular characteristics—such as a physical aptitude for, or a keen interest in, agriculture—for larger inheritances. This would be problematic for identification if such physical and mental traits also drive employment and migration decisions. Similarly, within a household, parents may prioritize children with good marriage prospects in the village (Fafchamps and Quisumbing,

2005). As such children face lower search costs in finding a partner, they may find higher- quality partners and marry at an earlier age, thus reducing the likelihood of long-distance and rural-to-urban permanent migration. Parents could also prioritize children most likely to help them in old age (Bernheim et al., 1985). Such children may be more or less likely to migrate or to work in agriculture; helpful children may be those who are helpful due to superior physical and mental endowments, but they may also be those who are helpful due to inferior endowments and thus greater willingness to stay behind and serve parents. As these different potential sources of omitted variable bias may skew OLS estimates in different directions, it is not possible to sign the direction of bias.

We address such sources of omitted variable bias in two main ways. First, we control for a number of factors that may influence the land allocations that youth receive and which are also likely to influence migration, employment, and educational opportunities and decisions. All of our specifications include household fixed effects to capture all characteristics of a community (kebele) and a household that may influence youths' decisions. These include the availability of land (community wide as well as within the household), laws and regulations, customs and traditions, the full history of community land redistribution, as well as access to agricultural and non-agricultural employment opportunities and educational institutions.

We additionally allow kebeles to have different impacts on individuals according to their gender, age, and marital status by including interactions of kebele fixed effects with a dummy for being male, with fixed effects for the descendant's age, and with a dummy for being mar- ried at baseline. This could capture the fact that, for example, different local governments may preferentially treat males, youth at critical stages such as those just reaching marriage- able age, or the married when redistributing land to individuals.

Our household fixed effects control for the total amount of land available to the house- hold. However, within households, there is a great deal of variation in expected inheritance across descendants. Some of this may be explained by a number of individual characteristics for which we control: being male, being the oldest male, age, marital status, whether the individual is a child of the head, whether they have completed the first cycle of primary school (grade 4), and whether they were themselves at least

age 18 at the time of the last land redistribution. The set of older descendants a youth has is also likely to influence both the youth's decision-making and his access to land since older descendants are a) likely to inherit land and other assets before him and b) may provide information or support in iden- tifying and obtaining employment or educational opportunities. Following Vogl (2013), we include fixed effects for the exact permutation of older descendants (mostly comprised of siblings, but also including a small number of grandchildren or step-children of the head) that the youth has above them in the birth order (e.g., no older descendants, Boy (B)-Girl (G)-Boy (B), GB, BG, BBBB, G, etc)[22]. 22 We additionally control for having more than one male descendant immediately below (younger than) one's self in the birth order. Males in Ethiopia generally receive larger land inheritances than do females, and any individual's land inheritance tends to be smaller when they are immediately followed by multiple males.

Second, we implement an instrumental variables (IV) strategy. Specifically, we leverage a unique feature of Ethiopia: given its authoritarian regime, land access in Ethiopia is influ- enced by government efforts to redistribute land. There is significant geographic variation in such redistributions; the median year is 2003, but these range in time from 1992 to 2013[23].

Our in-depth interviews with kebele officials suggest that males over age 18 receive priority at the time of redistribution. This suggests that households with a greater share of their male descendants being over age 18 at the time of the most recent land redistribution should have relatively more land allocated to these descendants. While our fixed effects capture the average impacts of these redistributions (as well as their gender-, age-, and marital status- specific impacts), their impacts may vary in other ways within a household. Specifically, we would expect "marginal" individuals at high risk of receiving a small inheritance to benefit most from having a greater share of their male co-descendants be over age 18 at the time of the land redistribution. Our data reveal one such vulnerable group: those with more than one male descendant immediately below them in the birth order, for whom their household's head will very soon after them have two or more boys reaching the age of inheritance. In our dataset, the median male land inheritance (in terms of land area) is 60 percent greater than that of the median female. As such, brothers pose a larger threat to inheriting land.

We use a single interaction term as an instrumental variable for expected land inheritance: the share of male descendants in the household who were over age 18 at the time of the land redistribution interacted with a dummy for having more than one male descendant immediately follow them in birth order. As we have one excluded instrument (an interaction term) and one endogenous variable, our model is exactly identified. The instrumental variable is summarized in Table 2; its mean is 0.03.

Our first stage equation states that an individual's expected land inheritance, measured as L_i, is a function of the product of the share of male descendants in the household who were over age 18 at the time of the most recent land redistribution, r_i and a dummy for having more than one male descendant immediately follow one's self, m_i:

$$L_i = \delta_0 + \delta_1 r_i \times m_i + \delta_2 m_i + \theta \mathbf{X}_i + \pi_j + \eta_i \qquad (2)$$

where π_j are household fixed effects.[24]

The validity of this instrument rests on a single identifying assumption: The difference in the effect of having a larger share of male descendants in the household be over age 18 at the time of land redistribution on those with versus without more than one male descendant immediately below them in birth order only affects migration and employment decisions through its effect on expected land inheritance. Importantly, the individual components of the excluded instrument, m_i and r_i, are included in our main specification of Equation 1 (the latter through our use of household fixed effects). That is, we explicitly allow both of them to directly impact our migration and employment outcomes. We do not claim that either of them only affects such outcomes through their effect on the size of an individual's inheritance. Thus, we need only believe that their interaction is a valid instrument—not that either of the two variables in level form is a valid instrument.

In Table 3, we show that this instrument satisfies the inclusion restriction: it is a strong predictor of the size of individual i's land inheritance. In our baseline specification with our full control set (column 2), a standard deviation (0.11 unit) increase in the excluded instrument makes one's land inheritance 1.3 times greater[25]. The F statistic on the excluded instrument is 26.6, suggesting no problems of

[22] As in Vogl (2013), with this control set, we anticipate that the gender of the next sibling after a descendant, conditional on having such a sibling, can be taken as if random.

[23] In 20 kebeles, a land redistribution occurred after 1991 (in the post-Derg regime era). In 7 kebeles, no such redistribution occurred. In those kebeles in which no redistribution occurred, we code that the share of descendants over 18 at the time of the most recent land redistribution was 0, to reflect that none of the descendants in the household helped the household obtain more land by virtue of their age.

[24] r_i does not appear in the regression in its level form as it is collinear with our household fixed effects.

[25] This comes from taking $\exp(2.478 \times 0.11) = 1.3$.

weak instruments[26]. We argue that the exclu- sion restriction holds since the precise timing of land redistributions in a community—and specifically, the difference between its effect on those with versus without multiple male descendants immediately below them in the birth order—should be exogenous to the within- household selection mechanism determining the size of individual land inheritances.

A potential concern with our IV strategy is that kebeles with relatively early (or late) land redistributions may simply be on different time trends with respect to how having younger brothers influences within-household allocations of land. If this were the case, then it might not be the land redistribution itself that explains the strength of our first stage, but rather just the order in which kebeles experienced such a redistribution (with that order potentially being endogenous to factors influencing youth employment and migration decisions)[27]. Our first stage would be just as strong if we were to instead pretend that each kebele's land redistribution occurred in year t + k rather than year t, for k $\in$ (−∞, ∞). We carry out this placebo analysis in Figure 1, for integer values of k $\in$ (−15, 15), plotting k on the x- axis and the F statistic on the excluded instrument in our main specification (column 2 of Table 3) on the y-axis. We see that the F Statistic is maximized when k = 0 (i.e. when we use for each kebele the actual year, t in which land redistribution occurred). Further, it quickly deteriorates as we move away from k = 0. Indeed, among the 30 years to which we try perturbing the actual year of redistribution, for 26 we obtain an F Statistic indicating problems of weak instruments[28][29]. Overall, these findings are encouraging; they suggest that it is the extra land being made available by redistributions, and not different trends across kebeles with early versus late redistributions, that is driving our strong first stage results.

6. Results

6.1 OLS Estimates

Table 4, Panel A provides ordinary least squares (OLS) results from regressions of permanent migration (columns 1–2), long-distance permanent migration (columns 3–4), and permanent migration to an urban area (columns 5–6) on a youth's logged amount of expected land in- heritance, in hectares. We present specifications with (even-numbered columns) and without (odd-numbered) our full control set; all specifications include household fixed effects.

In our preferred specification with our full set of controls, a 10 percent increase in a youth's land inheritance is associated with a 1.6 percentage point decrease in the incidence of permanent migration[30]. This represents a 3.0 percent decrease relative to the mean rate of permanent migration. Inheriting land is also associated with a lower incidence of long- distance permanent migration, and less permanent migration to urban areas in particular. These findings are present regardless of whether we include our full control set. A 10 per- cent increase in land inheritance is associated with a 2.4 percentage point decrease in the incidence of long-distance permanent migration, and a 2.7 percentage point decrease in the incidence of permanent migration to urban areas. Relative to the means of each of these outcome variables, these indicate an 8.9 percent and a 7.9 percent reduction in long-distance permanent and rural-to-urban permanent migration, respectively. This suggests that re- ceiving a land inheritance is associated with less migration, but that the magnitude of its impacts are particularly large for long-distance and rural-to-urban migration.

Table 4, Panel B presents OLS results from regressions of one's primary sector of employ- ment being agriculture (columns 1–2), non-agriculture (columns 3–4), and being a student (columns 5–6) on a youth's logged amount of expected land inheritance, in hectares. The likelihood of one's primary sector of employment being agriculture is significantly larger for those who have inherited or expect to inherit land, regardless of whether we include our full control set. In our preferred specification with our full set of controls, increasing a youth's land inheritance by 10 percent is associated with a 2.5 percentage point increase in the incidence of one's primary sector of employment being agriculture, which is a 7.8 percent increase relative to the mean incidence of employment in agriculture. The amount of land inheritance is also correlated with a lower incidence of employment in the non-agricultural sector, although this effect is not statistically significant at conventional levels (p-value = 0.16). While land inheritance is negatively correlated with whether or not an individual's primary occupation is being a student, the correlation is not robust to the inclusion of our full control set[31].

[26] If we instead compute the excluded instrument using the share of total descendants that was over age 18 at the time of the land redistribution, rather than the share of male descendants, we obtain a slightly smaller F statistic of 26.2.

[27] Table 1 shows this order, with Tulugura kebele experiencing the first redistribution, followed by Fundisa and Arjo a year later, and Shemagile Giyorigis experiencing the latest land redistribution.

[28] In our main specification, the Stock-Yogo critical value for 10 percent maximal IV size for a Cragg-Donald F Statistic is 16.38.

[29] Further, the four other "sufficiently high" F Statistics occur at t − 5, t − 4, t − 3, and t − 2; this may be due to redistribution policies in some kebeles favoring not those over age 18, but rather those over age 23 (or age 22, or age 21, or age 20)—that is, youths slightly older than 18.

[30] Given our level–log model, here and elsewhere, the effect of a 10 percent increase in land inheritance is obtained by taking the coefficient on expected land inheritance × ln(1.1).

[31] We obtain similar results (available upon request)—for both our migration and employment outcomes—when we instead measure land access using a dummy for whether or not an individual has inherited or expects to inherit land.

6.2 IV Estimates

The OLS estimates presented thus far may fail to account for important, within-household variation in factors that influence both land inheritance as well as migration and employment decisions. To address this endogeneity problem, we next turn to IV estimates. Section 5.1 outlined our IV identification strategy and described our excluded instrument: the share of male descendants in the household who were over age 18 at the time of the most recent land redistribution interacted with a dummy for having more than one male descendant immediately follow one's self.

Table 5, Panel A compares our earlier OLS estimates of the impacts of the size of land inheritance on migration outcomes (columns 1–3) with IV estimates that account for the endogeneity of land inheritance to migration (columns 4–6). Compared to the OLS esti- mates, the IV estimates are larger—though, for the case of permanent migration to any area, the effect is no longer statistically significant. However, we still find strong impacts on long-distance permanent migration and rural-to-urban permanent migration. A 10 percent increase in a youth's land inheritance is associated with an 8.1 percentage point decrease in the incidence of long-distance permanent migration and a 4.8 percentage point decrease in the incidence of rural-to-urban permanent migration. Relative to the means of each of these outcome variables, these indicate a 30.0 percent, and a 14.1 percent reduction in long- distance permanent migration and rural-to-urban migration, respectively.

In Panel B of Table 5, we compare OLS estimates of the impacts of the size of land inheritance on employment outcomes (columns 1–3) with IV estimates (columns 4–6). The significant, positive impact of inheriting more land on employment in agriculture is now even larger in magnitude and more statistically significant; the IV results show that a 10 percent increase in expected land inheritance increases the incidence of employment in agriculture by 6.2 percentage points, which is a 19.4 percent increase relative to the mean incidence of employment in agriculture (significant at the 0.01 level). The impact of the amount of land inherited on employment in the non-agricultural sector is also larger in the IV results, and also significant at the 0.01 level; a 10 percent increase in land inherited leads to a

4.1 percentage point increase in employment in the non-agricultural sector, which is a 21.6 percent increase relative to the variable's mean. As in the OLS results, however, we find no impact of receiving a larger land inheritance on the probability of being a student. Inheriting land seems to powerfully impact one's sector of employment, but not one's choice of whether or not to study.

6.3 Impacts by Gender and Age

While we have thus far identified average impacts of the size of land inheritance on youth migration and employment outcomes, we have not examined how these impacts differ across youth with different characteristics. However, from a policy perspective, it is important to understand which individuals in our sample are most driving these results. Of special im- portance are the differential impacts on men versus women, and on youth at different ages— specifically, above versus below median for our sample, which involves separately considering 15–19 year olds and 20-34 year olds. Given cultural and social norms that often disfavor women in land inheritance (Fafchamps and Quisumbing, 2002) and in educational and em- ployment opportunities (Croppenstedt et al., 2013), one might expect land inheritance to have a significantly different impact on young women than on their male co-descendants. In addition, a lack of financial independence can delay other social and political milestones in youths' lives (Honwana, 2012). Thus, the very young may not be poised to take large migration and employment decisions in response to an inheritance, while older youth may be at critical junctures in which land strongly influences decision-making.

Table 6, Panel A estimates a model in which we interact our full set of individual-level controls with gender; this allows us to compare how well land inheritance predicts migration and employment outcomes for men versus women, and to test for any statistically significant differences. Given problems of weak instruments for this interacted model, we estimate by OLS[32]. This is less of a concern given the consistent story—in terms of sign and statistical significance—told by our OLS and IV results for our key outcomes. Also, to the extent that the bias in our OLS estimates is uncorrelated with gender, the relative size of the coefficients on land inheritance for men versus for women is informative.

What is immediately apparent is that men are driving our results for migration. Land inheritance is not a significant predictor of permanent migration by women, but it predicts a significantly lower likelihood of long distance permanent migration and rural-to-urban permanent migration for men. Further, these differences are both significant at the 0.01 level. We also find that larger inheritances predict a greater likelihood of working in the agricultural sector for both genders, though this finding is statistically significantly larger in magnitude for men than it is for women. That is, increasing a man's inheritance increases his likelihood of working in agriculture more than it increases a woman's chances. While inheriting more land predicts a lower probability of working in the non-agricultural sector for both genders, this finding is only statistically significant for men. A small land inheritance may drive men

[32] Due to degrees of freedom considerations in these analyses by gender and youth age group, we estimate a slightly modified specification that uses gender, marital status, and age fixed effects instead of fixed effects for kebele × gender, kebele × marital status, and kebele × age fixed effects.

to the non-agricultural sector, but women do not take up these non-farm opportunities—possibly due to the above-hypothesized higher barriers to entry that they face. This difference between the findings for men and women is statistically significant at the 0.05 level. Finally, inheriting more land does not predict a higher probability of being a student for either gender.

In Panel B of Table 6, we estimate a model in which we interact our full set of individual- level controls with a dummy for being 20 years old or older—the median age in our sample, allowing us to compare how well land inheritance predicts migration and employment out- comes for each group. Once again, we estimate using OLS in response to problems of weak instruments. We see that our migration results are mostly driven by those aged 20–34 (older youth), as are reductions in employment in the non-agricultural sector. This is consistent with older youth being those most vulnerable to having decisions impacted by land inher- itance, while the relatively young are not yet taking major life decisions in response to an expected inheritance. However, land inheritance predicts similar increases in employment in agriculture for both groups. As for men and women individually, neither below-median nor above-median aged youth are more likely to be students as a result of inheriting more land. Overall, it seems that land inheritance does not matter much for whether or not one studies—either in the aggregate, or for a particular gender or age group. This is consistent with the overall low prioritization of education among rural households in Ethiopia relative to other countries (Dillon and Barrett, 2014).

6.4 Impacts by Rental Markets and Proximity to Urban Center

It is also critical to examine the role of mediating factors that may heavily influence youths' costs of migration, opportunity costs, and barriers to entry into non-farm labor. We consider two such mediating factors: the quality of land rental markets and travel time to a major urban center. We differentiate kebeles with relatively low land rental activity from those with relatively high land rental activity by examining if a kebele is below- or above-median in terms of the share of households renting out land. We distinguish kebeles that are relatively close and relatively far from a major urban center by again dividing our sample kebeles into those that are below- and above-median in terms of travel times, respectively. Following the Ethiopia Central Statistical Agency, we define major urban centers as all regional capitals plus any other cities with a population of 100,000 or more in 2007 (CSA, 2014). The 26 cities range in size from 20,824 to 3,156,057, and have a median population of 110,086; they are listed in Appendix Table A1. Once again, we estimate a model by OLS in which we interact our full set of individual-level controls with one of these two dummies—either a dummy for having below-median land rental market activity, or a dummy for having an above-median travel time to a major urban center[33].

As shown in Table 7, the size of land inheritance is a more powerful predictor of spatial and sectoral location decisions in areas with more vibrant land rental markets and those close to major urban centers. Where land rental market activity is low (below median), a reduction in one's land inheritance predicts a significantly greater tendency to migrate to an urban area and be employed in the non-agricultural sector than we see in areas with richer rental markets. Rental may be a viable alternative to inheritance, but where such markets are weak, youth not inheriting land will tend to migrate and enter the non-agricultural sector in higher numbers. This provides evidence of the partial substitutability of land access via inheritance versus land rental markets. Similarly, travel time to a major urban center matters as well; for those far away (above median travel time), a reduction in one's land inheritance is a significantly greater predictor of long-distance and rural-to-urban permanent migration, and of employment in the non-agricultural sector, then it is for those nearby. When an urban center is nearby, youth employment in the non-agricultural sector is largely unaffected by the size of land inheritance, and we see little impact on long-distance or rural-to-urban migration, reflecting greater off-farm employment opportunities close to home.

7. Discussion

We find strong relationships between expected land inheritance and youths' (ages 15–34) likelihoods of engaging in long-distance permanent migration, rural-to-urban permanent mi- gration, and non-agricultural sector employment in rural Ethiopia. Our empirical model— which exploits exogenous variation in the timing of land redistributions to overcome the endogeneity of the size of land inheritance—predicts that a 10 percent increase in inheri- tance size reduces rural-to-urban migration and employment in the non-agricultural sector by 4.8 and 4.1 percentage points, respectively. These findings are largely driven by the male and 20-34 year old sub-populations. The period of 20 to 34 years of age is crucial because it is the stage of the life cycle where individuals typically form new households. The fact that the employment decisions of older youth are most susceptible to expected land inheritance evokes a common trend, the African concept of waithood (Honwana, 2012), whereby older youth postpone major employment decisions until they attain financial independence.

We examine two prominent features of land and labor markets to measure the extent to which youth

[33] These regressions further include fixed effects for kebele × gender, kebele × marital status, and kebele × age fixed effects, as well as their interactions with one the two dummies (for rental market activity or for travel time to a major urban center).

employment decisions are constrained by land inheritance. First, we consider the role of access to land rental markets, which could provide an alternative to inherited land and facilitate youth self-employment in agriculture. The relationship between land inheritance and rural-urban migration appears to weaken, and that between land inheritance and non- agricultural employment is entirely eliminated, in areas of high rental market activity. This reaffirms the notion that push factors dominate pull factors in dictating migratory decisions in Ethiopia (World Bank, 2010). Our results highlight youth preferences to use migration or non-agricultural employment as a last resort after exhausting all means of access to land (such as temporary arrangements via land rental markets). It also supports the notion that rural inhabitants tend to diversify sectorally (Schmidt and Bekele, 2016), particularly in areas constrained by land availability, rather than exit agriculture altogether.

Second, we assess whether a reduction in either moving costs or search costs, captured by being closer to an urban area, mediates the effect expected inheritance has on employ-ment and relocation. There is no apparent relationship between land inheritance and either migration or non-agricultural sector employment in areas closest to urban areas (those with below-median travel times). The wage gap between rural and urban areas is likely negli- gible in such settings, disincentivizing migration. Moreover, employment in places close to urban areas is likely driven by labor demand. In contrast, in remote areas, youth are most likely pushed to diversify through non-agricultural sector employment or migration when subject to liquidity constraints, as under periods of income variability (Gray and Mueller, 2012) or land scarcity (Bezu and Holden, 2014; Deininger et al., 2007). We show that by relaxing youth constraints on land in remote areas, the proclivity to engage in long-distance migration or rural non-farm employment is greatly reduced.

Our findings have broader implications for the development strategies available to Ethiopia. Absent government intervention, the decline in arable land over time may increase youth unemployment and urbanization. In this regard, relaxing policy-induced frictions in the land rental market in the country (Holden and Ghebru, 2016), or otherwise freeing up land for individual use, can result in far-reaching impacts in reducing youth unemployment. Educational campaigns, starting at a young age, in conjunction with investments in the ser- vice and manufacturing sectors will be crucial to absorb the fraction of youth with limited opportunities for landownership. The government has signaled its commitment to the latter under its 5-year Growth and Transformation Plan (2015/16-2019/20) (Schmidt and Bekele, 2016). Finally, there is growing need to initiate a modernization in the agricultural sector, by increasing access to extension and encouraging widespread adoption of agricultural tech- nologies. Agricultural growth will increase rural household welfare, generating the demand for auxiliary services and goods which landless rural youth can provide

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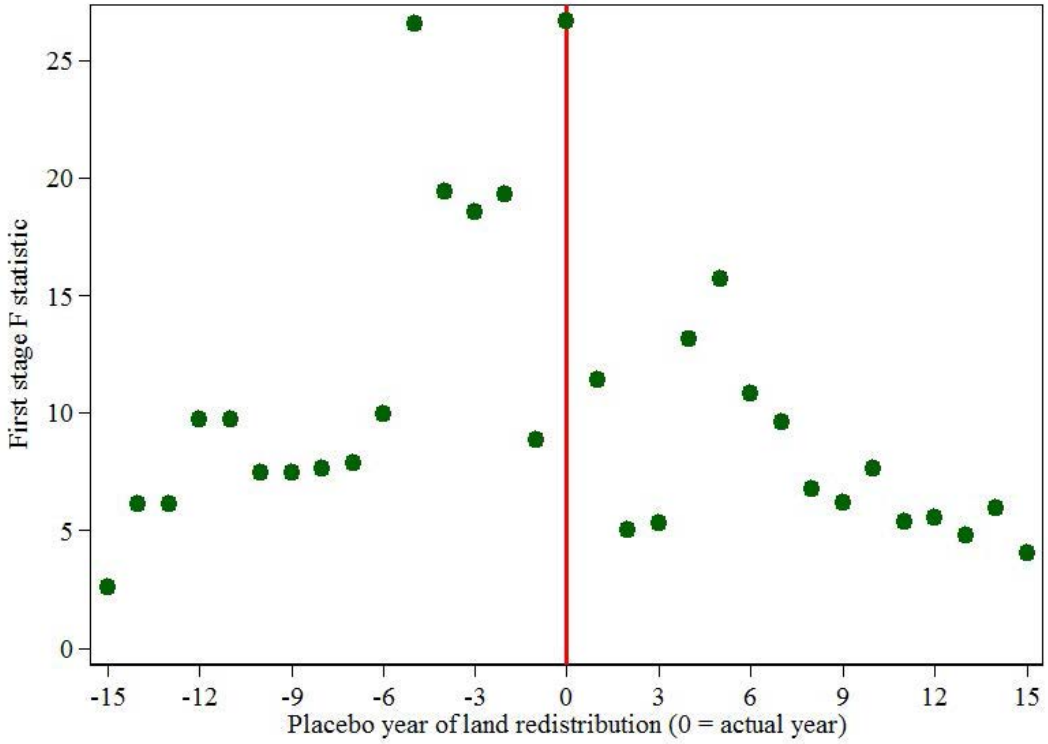
Figure 1 – Placebo analysis: First Stage F statistics if land redistribution is assumed to occur before or after the actual year



Source: Authors' calculations based on IFPRI's Watershed Surveys of 2010 and 2014

Notes: The x-axis indicates the number of years after the actual year of land redistribution that we assume land redistribution occurred; positive numbers indicate that we pretend it occurred in later years than the actual, while negative numbers indicate that we pretend it occurred in earlier years. The y-axis displays the First Stage F Statistic on our excluded instrument (from estimating column 3 of Table ??). The vertical line at x = 0 highlights the value of the F Statistic when we use the actual year of land redistribution

Table 1 – Observations by years of last land redistribution

Panel A: Year of Most Recent Post-Derg Era Land Redistribution

Kebele	Year
Tulugura	1992
Fundisa	1993
Arjo	1993
Agemi Nijar	1997
Kaka	1997
Gesges Shibirime	1997
Wajarba	1997
Taime Abekidan	1997
Esey Debr Ganba Gubiya Jantega	1997
Yetijan Shebelima	2003
Kenge Abo Amesha	2003
Atsed Mariya	2004
Leklekitaq	2005
Cholmana Mntura	2005
Disbasfilira	2005
Kersa Wolega	2006
Gombo Kiltu Jale	2006
Belita Amijye	2010
Dat Giyorgis	2012
Shemagile Giyorigis	2013
Kologelan	none
Wanesha Dabus	none
Aintodele	none
Hadaresa Bila	none
Kolba Anchabi	none
Meksaleku	none
Kela Beroda	none

Panel B: Distribution of Year of Most Recent Land Redistribution within estimation sample

Year	Share of observations
1992	3.4
1993	9.5
1997	21.8
2003	6.5
2004	4.4
2005	9.5
2006	9.2
2010	4.0
2012	1.7
2013	3.6
none	26.6

Source: Authors' calculations based on IFPRI's Watershed Surveys of 2010 and 2014
Notes: Number of observations, 1,989, is based on the sample used for estimation

Table 2 – Descriptive statistics

	Full Sample			Sample With Non-0 Expected Land Inheritance		
	Mean	SD	N	Mean	SD	N
Panel A: Outcomes						
Dummy - permanent migrant	0.53	0.5	1717	0.45	0.50	1170
Dummy - permanent migrant out of woreda	0.27	0.44	1709	0.21	0.41	1167
Dummy - permanent migrant to urban area	0.34	0.47	1709	0.28	0.45	1167
Primary occupation is in ...						
Agriculture	0.32	0.47	1713	0.37	0.48	1167
Non-agriculture	0.19	0.4	1713	0.16	0.36	1167
Student	0.30	0.46	1713	0.29	0.45	1167
Domestic	0.13	0.34	1713	0.13	0.34	1167
Unemployed	0.04	0.19	1713	0.04	0.19	1167
Panel B: Land access						
Dummy - inherited or expects to inherit land	0.71	0.45	1717	1.00	0.00	1170
Land inheritance (hectares)	0.34	2.14	1671	0.48	2.54	1170
Log land inheritance	-1.36	0.92	1170	-1.36	0.92	1170
Panel C: Individual Controls						
Dummy - male	0.64	0.48	1717	0.67	0.47	1170
Age	19.9	4.05	1717	19.9	4.09	1170
Dummy - child of head	0.97	0.16	1717	0.98	0.13	1170
Dummy - married	0.05	0.21	1717	0.05	0.23	1170
Dummy - > 1 male descendant immediately follows in birth order	0.25	0.44	1717	0.25	0.43	1170
Number of older male direct descendants	1.38	1.49	1717	1.37	1.48	1170
Number of older female direct descendants	1.18	1.38	1717	1.17	1.38	1170
Dummy - Age 18+ at time of land redistribution	0.18	0.38	1717	0.17	0.38	1170
Dummy - completed cycle 1 of primary school (grade 4)	0.70	0.46	1717	0.68	0.47	1170
Panel D: Household Characteristics						
Household size	7.13	2.24	834	7.16	2.28	625
Number of men 18+ in household	1.96	1.08	834	2.00	1.09	625
Number of women 18+ in household	1.65	0.87	834	1.68	0.89	625
Number of direct descendants of household head	7.09	2.62	834	7.11	2.74	625
Dummy - metal roof	0.67	0.47	834	0.67	0.47	625
Dummy - improved floor	0.03	0.17	834	0.03	0.17	625
Dummy - head of household is male	0.84	0.37	834	0.83	0.37	625
Head of household age	52.2	10.92	834	52.8	10.99	625
Dummy - head of household has no education	0.59	0.49	834	0.58	0.49	625
Dummy - Orthodox Christian	0.72	0.45	834	0.71	0.46	625
Dummy - Protestant	0.22	0.41	834	0.25	0.43	625
Dummy - Muslim	0.02	0.14	834	0.01	0.11	625
Share of males 18+ at time of land redistribution	0.17	0.29	834	0.17	0.3	625
Panel E: Instrument						
Excluded instrument*	0.03	0.11	1717	0.02	0.1	1170

Source: Authors' calculations based on IFPRI's Watershed Surveys of 2010 and 2014

Notes: *The share of male descendants who were over age 18 at the time of the redistribution interacted with a dummy for having more than one male descendant immediately follow one's self. Land redistribution always refers to the most recent redistribution.With land refers to those who either have already inheritted land or expect to inherit land. Improved floor refers to being made from concrete, stone, cement, tile, bricks, or wood (not made from earth or cow dung). Households without a descendant in the sample are not included in household characteristics descriptive statistics. Religions are those of the household head

Table 3 – IV first stage results

	Outcome: Log land inheritance	
	(1)	(2)
Excluded instrument: Share of male descendants 18+ at time of land redistribution × Dummy - > 1 male descendant immediately follows in birth order	2.501***	2.478***
	(0.460)	(0.480)
Dummy - >1 male descendant immediately follows in birth order	-0.082	-0.079
	(0.061)	(0.065)
Observations	1,170	1,170
R-squared	0.902	0.902
Number of households	625	625
First stage F stat	29.59	26.63
Full set of individual-level controls?	No	Yes

Source: Authors' calculations based on IFPRI's Watershed Surveys of 2010 and 2014. Notes: Individual-level controls include dummies for being a child of the head of household, for being at least 18 years at the time of the kebele's last land redistribution, for completing cycle 1 of primary school (grades 1-4), and for being the oldest direct descendant and being male. The first stage F stat is the t-statistic on excluded instrument squared. Also included are household fixed effects and fixed effects for exact permutation of older sibling sex, for kebele × age fixed effects, for kebele × marital status, and for kebele × gender. Standard errors are in parentheses and clustered at the kebele level

Table 4 – OLS results showing how the amount of land inheritance predicts migration and employment decisions

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Migration						
	Dummy - migrated ...					
	Anywhere		Out of woreda		To urban area	
Log land inheritance	0.025	-0.165**	-0.085**	-0.252**	-0.128***	-0.283***
	(0.051)	(0.076)	(0.037)	(0.094)	(0.043)	(0.081)
Additional controls	No	Yes	No	Yes	No	Yes
Observations	1,170	1,170	1,167	1,167	1,167	1,167
R-squared	0.001	0.783	0.011	0.788	0.024	0.800
Number of households	625	625	624	624	624	624
Panel B: Occupation						
	Dummy - primarily employed in ...					
	Agriculture		Non-agriculture		Student	
Log land inheritance	0.309***	0.262**	-0.059	-0.180	-0.142***	-0.050
	(0.044)	(0.109)	(0.042)	(0.126)	(0.042)	(0.201)
Additional controls	No	Yes	No	Yes	No	Yes
Observations	1,167	1,167	1,167	1,167	1,167	1,167
R-squared	0.095	0.815	0.006	0.753	0.021	0.778
Number of households	625	625	625	625	625	625

Source: Authors' calculations based on IFPRI's Watershed Surveys of 2010 and 2014

Notes: Migrated is defined as living in the household during round 1, and living elsewhere in round 2. Additional controls include dummies for being a child of the head of household, for being at least 18 years at the time of the kebele's last land redistribution, for completing cycle 1 of primary school (grades 1-4), for being the oldest direct descendant and being male, and for having multiple male descendants immediately following in the birth order. Also included are fixed effects for exact permutation of older sibling sex, for kebele × age fixed effects, for kebele × marital status, and for kebele × gender. Standard errors are in parentheses and clustered at the kebele level

Table 5 – Comparison of OLS and IV results showing how the amount of land inheritance predicts migration and employment decisions

	OLS			IV		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Migration						
	Dummy - migrated ...					
	Anywhere	Out of woreda	To urban area	Anywhere	Out of woreda	To urban area
Log land inheritance	-0.165**	-0.252**	-0.283***	-0.198	-0.855***	-0.508***
	(0.076)	(0.094)	(0.081)	(0.199)	(0.173)	(0.173)
Observations	1,170	1,167	1,167	1,170	1,167	1,167
R-squared	0.783	0.788	0.800	0.783	0.727	0.791
Number of households	625	624	624	625	624	624
First Stage F-Stat				21.73	21.73	21.73
Panel B: Employment						
	Dummy - primarily employed in ...					
	Agriculture	Non-agriculture	Student	Agriculture	Non-agriculture	Student
Log land inheritance	0.262**	-0.180	-0.050	0.655***	-0.427***	-0.171
	(0.109)	(0.126)	(0.201)	(0.168)	(0.095)	(0.140)
Observations	1,167	1,167	1,167	1,167	1,167	1,167
R-squared	0.815	0.753	0.778	0.799	0.742	0.776
Number of households	625	625	625	625	625	625
First Stage F-Stat				22.61	22.61	22.61

Source: Authors' calculations based on IFPRI's Watershed Surveys of 2010 and 2014

Notes: Migrated is defined as living in the household during round 1, and living elsewhere in round 2. All specifications include dummies for being a child of the head of household, for being at least 18 years at the time of the kebele's last land redistribution, for completing cycle 1 of primary school (grades 1-4), for being the oldest direct descendant and being male, and for having multiple male descendants immediately following in the birth order. Also included are fixed effects for exact permutation of older sibling sex, for kebele × age fixed effects, for kebele × marital status, and for kebele × gender. Standard errors are in parentheses and clustered at the kebele level

Table 6 – Analysis of impacts of size of land inheritance on migration and employment out- comes by gender and by age (OLS)

	Dummy - migrated ...			Dummy - primarily employed in ...		
	Anywhere	Out of woreda	To urban area	Agriculture	Non-agriculture	Student
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: By gender						
Log land inheritance (women)	0.097	0.024	-0.022	0.154***	-0.078	-0.082
	(0.073)	(0.044)	(0.053)	(0.047)	(0.047)	(0.065)
Log land inheritance (men)	-0.003	-0.155***	-0.188***	0.226***	-0.163***	-0.058
	(0.062)	(0.047)	(0.051)	(0.047)	(0.042)	(0.061)
Observations	1,170	1,167	1,167	1,167	1,167	1,167
R-squared	0.418	0.449	0.415	0.563	0.436	0.525
Number of households	625	624	624	625	625	625
P-value of difference	0.11	0.002	0.004	0.093	0.022	0.614
Panel B: By age						
Log land inheritance (20-34)	-0.010	-0.104*	-0.149**	0.220***	-0.139***	-0.011
	(0.068)	(0.055)	(0.058)	(0.053)	(0.040)	(0.058)
Log land inheritance (15-19)	-0.024	-0.028	-0.107	0.221***	-0.061	-0.082
	(0.09)	(0.056)	(0.066)	(0.046)	(0.048)	(0.077)
Observations	1,170	1,167	1,167	1,167	1,167	1,167
R-squared	0.407	0.425	0.393	0.542	0.424	0.501
Number of households	625	624	624	625	625	625
P-value of difference	0.799	0.096	0.317	0.984	0.069	0.181

Source: Authors' calculations based on IFPRI's Watershed Surveys of 2010 and 2014

Notes: Migrated is defined as living in the household during round 1, and living elsewhere in round 2. Estimates are from completely interacted models where gender and age (15-19 years vs 20-34 years) dummies are interacted with all controls. All specifications include dummies for gender, for age, for marital status, for being a child of the head of household, for being at least 18 years at the time of the kebele's last land redistribution, for completing cycle 1 of primary school (grades 1-4), for being the oldest direct descendant and being male, and for having multiple male descendants immediately following in the birth order. Also included are fixed effects for exact permutation of older sibling sex. P-value of difference refers to the p-value for the interacted log land inheritance variable. Standard errors are in parentheses and clustered at the kebele level

Table 7 – Analysis of impacts of size of land inheritance on migration and employment out- comes by depth of land rental markets and by travel time to a major urban center (OLS)

	Dummy - migrated ...			Dummy - primarily employed in ...		
	Anywhere	Out of woreda	To urban area	Agriculture	Non-agriculture	Student
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: By land rental market activity						
Log land inheritance (low activity)	-0.337***	-0.181*	-0.514***	0.410***	-0.661***	0.418**
	(0.108)	(0.094)	(0.080)	(0.099)	(0.120)	(0.196)
Log land inheritance (high activity)	-0.179	-0.378**	-0.267***	0.443***	0.006	-0.361**
	(0.119)	(0.151)	(0.077)	(0.143)	(0.143)	(0.155)
Observations	1,170	1,167	1,167	1,167	1,167	1,167
R-squared	0.830	0.848	0.850	0.869	0.826	0.850
Number of households	625	624	624	625	625	625
P-value of difference	0.335	0.280	0.035	0.853	0.001	0.004
Panel B: By distance to major urban center						
Log land inheritance (close)	0.430***	0.173	-0.071	0.473**	0.090	-0.610***
	(0.079)	(0.131)	(0.064)	(0.204)	(0.121)	(0.104)
Log land inheritance (far)	-0.126	-0.330**	-0.317***	0.234*	-0.319**	0.116
	(0.100)	(0.158)	(0.073)	(0.125)	(0.148)	(0.289)
Observations	1,170	1,167	1,167	1,167	1,167	1,167
R-squared	0.841	0.849	0.871	0.892	0.828	0.849
Number of households	625	624	624	625	625	625
P-value of difference	0.000	0.021	0.018	0.327	0.042	0.026

Source: Authors' calculations based on IFPRI's Watershed Surveys of 2010 and 2014

Notes: Migrated is defined as living in the household during round 1, and living elsewhere in round 2. We calculate the share of households in each kebele with at least one parcel of land either rented, sharecropped, or temporarily loaned. The median share across the kebeles is 22.5%. Low and high activity refers to being below and above the median share of households, respectively. Close and far refer to a household being below or above (respectively) the median travel time (107 minutes) to a major urban center (regional capital or cities with a population of 100,000 or more in 2007). Estimates are from completely interacted models where rental market activity and distance dummies are interacted with all controls. All specifications include dummies for being a child of the head of household, for being at least 18 years at the time of the kebele's last land redistribution, for completing cycle 1 of primary school (grades 1-4), for being the oldest direct descendant and being male, and for having multiple male descendants immediately following in the birth order. Also included are fixed effects for exact permutation of older sibling sex, for kebele × age fixed effects, for kebele × marital status, and for kebele × gender. P-value of difference refers to the p-value for the interacted log land inheritance variable. Standard errors are in parentheses and clustered at the kebele level

Table A1: Major urban center populations (2007)

Major urban center	Total population
ASAYTA-TOWN	20,824
ASOSA-TOWN	35,752
GAMBELLA-TOWN	52,659
ADIGRAT-TOWN	72,375
KOMBOLCHA-TOWN	77,757
DILA-TOWN	77,856
ASELA-TOWN	83,591
DEBERE MARKOS-TOWN	86,225
DEBRE BREHAN-TOWN	87,204
NEKEMTE-TOWN	94,014
HOSAENA-TOWN	94,208
SODO-TOWN	98,930
ARBA MINCH-TOWN	101,819
HARAR-TOWN	118,353
BISHOFTU-TOWN	127,678
SHASHEMENE-TOWN	133,252
JIJIGA-TOWN	142,408
DESSIE-TOWN	152,568
JIMMA-TOWN	157,432
BAHIR DAR-TOWN	202,157
HAWASSA-TOWN	221,397
DIRE DAWA-TOWN	263,827
GONDER-TOWN	273,157
MEKELE-TOWN	284,652
ADAMA-TOWN	285,611
ADDIS ABABA	3,156,057

Source: CSA (2014)