The Effect of Land Access on 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 employment decisions? We explore this question in the context of rural Ethiopia using data on whether youth household members from 2010 had migrated by 2014, and in which sector they work. We estimate a household fixed effects model and exploit 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. Inheriting more land also leads to a significantly higher likelihood of employment in agriculture and a lower likelihood of employment in the non-agricultural sector. Conversely, the decision to attend school is unaffected. These results appear to be most heavily driven by males and by the older half of our youth sample. We also find suggestive evidence that several mediating factors matter. Land inheritance is a much stronger predictor of rural-to-urban permanent migration and non-agricultural-sector employment in areas with less vibrant land markets, in relatively remote areas (those far from major urban centers), and in areas with lower soil quality. Overall, these results affirm the importance of push factors in dictating occupation and migration decisions in Ethiopia.

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

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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).

1 Introduction

How does the amount of land youth stand to inherit affect their migration and employment decisions? In rural Africa, youth typically rely on inheritance, or small rental markets, to access parcels under usufruct land rights systems.[1] However, population 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 substitute for youth farm labor (Bustos et al., 2016). Pessimistic views on inheritance prospects may push some youth to delay entering the labor force by seeking secondary or tertiary education. Alternatively, youth may be encouraged to transition from low-return agricultural to high-return non-agricultural activities (Bezu and Barrett, 2012; Nagler and Naude, 2017). Understanding how land inheritance impacts such decisions is critical for understanding the likely impacts of demographic and technological changes on development.

Our main objective is to examine whether perceptions of land inheritance prospects (as a proxy for individual land access) affect youth migration and employment decisions in rural Ethiopia. Ethiopia is an ideal setting to study these dynamics. First, it is a primarily agrarian economy where land is central to livelihoods—as in much of the developing world. Second, geographic and temporal variation in land allocation policies, in a context where land is under public ownership, provide a natural experiment for understanding the causal effects of land inheritance.

Our analysis uses a unique household survey we conducted in 27 rural *kebeles* (the lowest formal administrative unit in Ethiopia, also known as peasant associations, communities, or sub-districts) of the Amhara and Oromia regions. Information on individual inheritance, migration, and employment were collected for a complete list of descendants (children) of the household head and/or their spouse. We construct a measure of individual expected land inheritance using detailed information provided by household heads on inheritances granted and expected to be granted to each descendant. As in Bezu and Holden (2014), we analyze multiple youth employment outcomes (permanent migration, long-distance permanent migration, rural-to-urban permanent migration, agricultural employment, non-agricultural employment, and being a student). Both employment diversification (via non-agricultural employment, migration, or both) and the pursuit of

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

education are potential risk diversification strategies. We consider how land inheritance impacts each and, further, how these relationships vary with gender and age. Lastly, we examine whether our main effects are significantly different in communities with varying levels of three mediating factors that might influence the costs of migration, opportunity costs, and barriers to entry into the non-agricultural sector: the prevalence of land rental, travel time to a major urban center, and average soil quality.

One of the main empirical challenges confronting our analysis is the endogeneity of individual land inheritance. Size of inheritance varies across and within households and is likely shaped by numerous unobservable factors correlated with individual labor activities. We estimate a household fixed-effects model and make use of historical land reforms in Ethiopia to develop an instrumental variable for expected individual land inheritance. Historically, access to land has been influenced by large-scale government efforts to redistribute land. Under such redistributions, the local government expropriated land from some households and reallocated it to others based on household size at the time (with particular attention to adult males). We administered kebele official surveys to identify the timing of land redistributions. We exploit significant spatial variation in the timing of such redistributions and demographic composition of households in the household survey to identify the causal impacts of inherited land on youth decision-making.

The paper is organized as follows. Section 2 reviews existing literature and identifies knowledge gaps we seek to address. Section 3 describes access to land in Ethiopia, the norms that govern land inheritance, and the current state—and potential drivers—of youth migration and employment decisions. Section 4 outlines our data source and methods of measuring land inheritance and outcomes. Section 5 describes our empirical strategy, including our method for identifying causal effects of land inheritance. Section 6 presents the main results as well as suggestive evidence on how they vary with gender, age, land rental market quality, proximity to a major urban center, and soil quality. Finally, Section 7 concludes.

2 Literature Review

We examine the extent to which physical mobility, occupational choice, and human capital accumulation relate to expectations on individual land inheritance, drawing on insights from the literature. As separate decision-making processes, the decisions to migrate (Abramitzky et al., 2013; Lambert et al., 2014), to engage in agriculture vs. non-agricultural activities (Bezu and Barrett, 2012; Maiga et al., 2015; Nagler and Naude, 2017), or to continue one's education (Estudillo et al., 2001) are based on their expected benefits to the individual (or the household, collectively). Wealth often factors into these decisions through at least two distinct channels. First, wealth signifies the ability of the household to financially support the costs associated with migration (Abramitzky et al., 2013), education, or the fixed costs of entering labor markets auxiliary

to agriculture (Bezu and Barrett, 2012). Second, if household wealth is indicative of individual skill, then the higher skill transferability of an individual will, in turn, augment the expected return to migration, to entering the non-agricultural labor market, or to delaying entry into the labor market to achieve greater lifetime earnings through education.

Land is a unique form of wealth, and thus its impacts on physical and occupational mobility are different than those of other forms of wealth. In many African contexts, land rental and purchase markets are quite limited, making it difficult or impossible to use land as a source of capital for financing investments (Lambert et al., 2014). Cultural norms and communal rules underlying land allocations introduce additional opportunity costs to diversifying labor across sectors or space. For example, the fear of land expropriation can arise in certain settings, whereby governments or communities threaten to confiscate land from a household if agricultural labor is not visibly productive (de Brauw and Mueller, 2012). Shipton and Goheen (1992) and Lambert et al. (2014) also note that the responsibilities that come with land ownership, including sharing one's land and farm products, can potentially diminish the benefits of one's inheritance. Finally, nonlinearities between physical capital endowments, employment, and migration decisions may exist, whereby the gains of staying behind outweigh any expected gains from moving (McKenzie and Rapoport, 2007) or diversifying out of agriculture among the extremely land rich (Bezu and Barrett, 2012).

Existing literature, much of it recent, generally finds that increased expectations on inherited land inclines individuals to either stay in their current residence or remain in the agricultural sector. However, there are some nuanced findings. Abramitzky et al. (2013) find in the context of historical Norway that siblings who were expected to inherit land—conditional on their origin region, birth order, and sibling composition—were less likely to migrate. The authors show that the decisions appear to be driven by the expected gains from moving. Older sons with greater expected inheritances than their siblings were less likely to migrate while, in contrast, brothers facing competition over inheritance from other brothers (not sisters) were more likely to migrate. Lambert et al. (2014) point out, for the case of Senegal, that land inheritance mitigates both the tendency to migrate and the tendency to diversify out of agriculture only among those who lack the responsibilities of being a head. The importance of headship follows the strong precedence in the African context for demonstrating that land is being used in order for the household to maintain its customary ownership. And in villages in Oromia and the SNNP regions of Ethiopia, Bezu and Holden (2014) show that intentions to remain in agriculture increase with land availability through inheritance among youth. They do not find a link between land inheritance and migration, though this may be attributable to the broad definition of migration they apply. Presumably, the expected return to migration will be contingent on the probability of employment and the expected wage gap between the origin and destination (Sjaastad, 1962; Harris and Todaro, 1970); both are likely to be more pronounced in the case of a rural origin and an urban

destination. Given our study is also performed in Ethiopia, we examine these relationships using a diverse range of migration variables and differentiating by the characteristics of the household's origin.

Our analysis aims to contribute to this existing literature by evaluating the causal impact of an individual's expected land inheritance on migration, sectoral shifts, and schooling in villages in the Amhara and Oromia regions of Ethiopia. Although our instrumental variables identification strategy—for which our instrument is strong overall, but weak in sub-populations of interest—cannot help us say causally how mediating variables condition the relationship between inheritance and employment and migration decisions, we can nonetheless explore mediators through suggestive ordinary least squares (OLS) regressions. These regressions allow us to consider how local land rental markets, access to urban centers, and soil fertility might mediate youth land-employment and land-migration relationships—an area of research which we argue merits empirical analysis. We first test whether inheritance has a statistically significantly different effect on migration and employment decisions in areas with strong vs. thin land rental markets. The fact that these markets may substitute for a lack of land inheritance offers one reason why a traditionally disadvantaged subpopulation, youth, is the most prominent group engaging in these markets in sub-Saharan Africa (Deininger et al., 2015). We posit that youth migration and employment decisions may be less sensitive to expectations concerning inheriting land in areas with robust rental markets. Although rental markets provide youth with access to land, we do not expect rented and inherited land to serve as perfect substitutes. There is likely a premium to having ownership or longer-term usage rights. This premium may be due in part to inheritance conferring more secure property rights than do rental contracts. We next test for differential inheritance effects on migration and employment decisions in areas near vs. far from a major urban center. If jobs are plentiful in urban locations, then lowering moving costs to these places can render rural-urban migration more desirable than other forms of internal migration (Sjaastad, 1962). However, the wage gap between one's origin and destination may be much smaller in areas close to cities, offsetting the benefits of more probable employment (Harris and Todaro, 1970). Thus, how youth employment and migration responds to inheritance size in areas closer to towns remains largely an empirical question. Finally, we consider whether the impact of land inheritance is statistically significantly stronger in places with more vs. less fertile soil; to the extent that soil fertility indicates the value of land, more fertile plots may exhibit an especially large pull, enticing individuals to stay in agriculture (Gray, 2011). At the same time, if soil is sufficiently fertile, very little may be needed to keep individuals in agriculture, and thus small reductions in land access may do little to drive individuals out of agriculture and/or to spur migration.

3 Background and Context

To understand how the expected size of land inheritance in rural Ethiopia is likely to affect the migration and employment decisions of youth, it is important to understand the context. This includes the means of accessing land in Ethiopia (including government redistribution policies), norms of inheritance, and the broader patterns of migration and employment present in the country.

3.1 Access to land in Ethiopia

Ethiopia has long faced severe problems of land scarcity. Population density is growing rapidly, leading farm sizes to dwindle. During 2011–2012, more than half of rural farm households in Ethiopia cultivated less than 1 hectare of land (Central Statistical Agency of Ethiopia (CSA), 2012). Further, a youth bulge promises to intensify these problems for youth in particular; as of 2015, 37 percent of the population of Ethiopia was between age 15 and 34 (Central Statistical Agency of Ethiopia (CSA), 2015). In such land-constrained countries under usufruct land rights systems, like Ethiopia, youth rely on periodic land redistributions, inheritance, and small rental markets for access to land.[2]

The Derg regime ruled Ethiopia from 1974 to 1991; land was formally owned by the government, which aimed to ensure a degree of equality in household access. The current Ethiopian People's Revolutionary Democratic Front (EPRDF) regime has been in place since 1991, following the collapse of the Derg. Land continues to be formally owned by the government, with formal land markets (sales) outlawed. The EPRDF regime introduced the land use certification program in the late 1990s to enhance land tenure security of households by issuing land holders a certificate granting perpetual land use rights (including transfer rights via inheritance). Land certification in our study regions of Amhara and Oromia is very common; 20 of the 27 sample kebeles had 90 percent or more of land area certified, and 25 of the 27 had 80 percent or more of land area certified. However, as under the Derg regime, large-scale administrative land redistributions have been justified as a means of equalizing land quality and providing land to landless households.

In the study regions of Amhara and Oromia, 20 of 27 sample kebeles had experienced a large-scale land redistribution since 1991 affecting the majority of households.[3] Under such redistributions, the local government takes land from land-abundant households and reallocates it to land-scarce or landless households, based on household size at the time (with particular attention to adult males).[4] Because redistribution is

[2]Rental and sharecropping provide access to agricultural land, but contracts are often tenuous and require sharecroppers to frequently change contracts and work different plots (Deininger et al., 2003, 2011).

[3]While communal grazing land and woodland are occasionally distributed to households, this is not nearly at the scale of the major land redistributions of the post-Derg era (Demeke, 1999).

[4]In the Amharic language used for the survey, we describe land redistribution as "land adjustment among households"—not injection of new lands into the kebele. This is reflected in our survey data, which capture the amount of land under individual cultivation in 2010 and 2014; in the sample of 27 kebeles as a whole, as well as among the subset of kebeles that experienced land redistribution between 2010 and 2014, the median change in land area under individual cultivation is 0 (i.e., no change).

decentralized, its timing hinges on the capacity, preparedness, and land availability of each kebele and its woreda, resulting in significant geographic variation in their timing, which we exploit to construct an instrumental variable for land inheritance. As shown in Table 1, the median year for land redistribution is 2003, but it ranges from 1992 to 2013.[5] We constrain our analysis to evaluate inheritance decisions associated with land redistributions after 1991 (when the current EPRDF was firmly established) for three main reasons: a) to avoid potentially confounding effects of changes in political regimes and national land policies, b) because the average child in our sample is under age 20 and thus an infant or not yet born at the time of pre-1992 land distributions, and c) because we were concerned that asking individuals to recall land reforms pre-dating the most recent set was likely to generate recall issues and accordingly yield noisy and inaccurate data.

Individual land users in the study regions have the legal right to transfer usufruct rights to children or other family members (ANRS, 2006, 2007; ONRS, 2007). Individuals can also rent their land use rights to any person—with some region-specific restrictions on the size and duration of the rental.[6] Land inheritances in Ethiopia are not uniform across descendants of the head—due to both cultural factors, such as norms associated with gender and birth order, and restrictions on land fragmentation.[7] In our sample, 41 percent of household heads reported that they would unequally divide land among those descendants.

3.2 Norms of Inheritance

Although statutory land tenure and inheritance laws in Ethiopia provide land to all rural citizens wishing to engage in agriculture, customary norms and practices tend to favor men (Fafchamps and Quisumbing, 2005).[8] First, marriage is primarily patrilocal, with the wife residing with or near the husband's parents. Second, sons (especially the firstborn) typically care for parents in old age (Kumar and Quisumbing, 2012). Finally, customary beliefs limit the agricultural activities in which females can engage (plowing, sowing seeds, and threshing are exclusively male activities), necessitating male labor participation on any agricultural 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) suggested that a groom's number of brothers

[5] We asked about the latest (most recent) redistribution to ensure that respondents recalled redistributions following the Derg regime. In 20 kebeles, a land redistribution occurred after 1991; in 7 it did not. The post-Derg major land redistributions in the Amhara region (one of the two regions the data come from) were predominantly implemented during 1997–1998 (Benin and Pender, 2001).

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

[7] Farm fragmentation is a challenge in Ethiopia—partly induced by population growth over the last 20–25 years. In response, many regions have introduced restrictions on plot size. Oromia sets a floor of 0.50 hectare for annual crops and 0.25 hectare for perennial crops (ONRS, 2007), while the minimum in Amhara is 0.25 and 0.11 hectare for plots under rainfed 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 the effects of sibling composition and rivalry on health outcomes (Kumar and Quisumbing, 2012; Mekonnen and Worku, 2011; Kushnick, 2010; Garg and Morduch, 1998; Morduch, 2000), educational outcomes

(but not sisters) has a strong negative effect on land inheritance at marriage. Gibson and Gurmu (2011) found that having more older brothers decreases a sibling's agricultural productivity (younger male siblings receive land that is less productive) and diminishes marriage opportunities (via fewer assets brought to the marriage). Lastly, previous research contends that the presence of not only older brothers but also younger siblings may affect youth employment decisions. 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. The primary reason for migration was to seek secondary education or non-agricultural employment.

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) reported that more than 42 percent of migrants stated that they would not have migrated if they had been able to make a living back home. Zeleke et al. (2008) reported that young men in Amhara region were the most likely to migrate, and respondents cited a lack of sufficient means of subsistence, shortage of land, and shortage of employment opportunities in rural areas as the primary motivations. 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 communitywide drought shocks. de Brauw (2014) and Lee and Mueller (2016) reported similar relationships between migration and land. As of 2013, rural-rural and rural-urban migration shares in Ethiopia were almost equivalent at 35 and 33 percent of total migrants, respectively (National Labor Force Survey (NLFS) 2013).

There are few rural employment opportunities outside of agriculture. Among rural-urban migrants aged 15–65 in a study of four African countries, only 36 percent were motivated to migrate in search of work (Mueller et al., 2015). Education was the strongest motivation for rural-urban migration (de Brauw et al., 2013; Mueller et al., 2015), following large national education investments during the last decade (World Bank, 2016). Schmidt and Bekele (2016) showed in the case of Ethiopia that only 23 percent of the economically active population primarily worked in the non-agricultural sector (NLFS 2013). Among non-agricultural-sector laborers, the largest share (30 percent) is engaged in sales. The remainder is divided among construction and mining (11 percent), food processing and craft work (8 percent), teaching (6 percent), and a variety of other service jobs. These are largely low-skilled occupations with limited labor demand, possibly explaining why youth are often pushed rather than pulled into them.

(Congdon Fors et al., 2015; Gibson and Sear, 2010; Lloyd et al., 2009; Butcher and Case, 1994), and inheritable wealth (Abramitzky et al., 2013; Grawe, 2010; Keister, 2003).

4 Data

We take advantage of a panel survey conducted in 2010 (round 1) and 2014 (round 2) by the International Food Policy Research Institute (IFPRI) in collaboration with the Ethiopian Development Research Institute (EDRI) (IFPRI, 2010, 2014). Round 2 collected detailed information on not only household members (on the roster) but also inheritance, employment, and migration data for all direct descendants between the ages of 15 and 34 at baseline (98 percent of them children)[10] of the household head or their spouse.

The round 1 (baseline) survey covered 1,810 households and was completed in July 2010. The sample was drawn from a list of woredas (districts) in the Blue Nile Basin in Amhara and Oromia.[11] The final sample consisted of 27 kebeles located in 9 woredas, with approximately 200 households surveyed per woreda. The locations of these woredas are shown in Figure 1.[12] 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 four years.

We use a cross-sectional dataset that includes all direct descendants of the household head[13] or the head's spouse who lived in the household in round 1 and were between the ages of 15 and 34 at that time. This results in a sample of 834 households with descendants in this age range with non-missing demographic information. Our data capture whether or not they left the household (permanently migrated) by round 2, and their sector of employment in round 2. We focus on both male and female descendants as nearly two-thirds of women in the sample are either employed in agriculture, the non-agricultural sector, or are students, and although less likely than men to migrate out of their woredas, they are even more likely to migrate to an urban area (see Appendix Table A1). Our controls are from round 1 to avoid reverse causality.

4.1 Variable Measurement

We measure youths' expected land inheritance by asking household heads about each of their direct descendants: how much land the person has already received[14] (the average is 0.15 hectares for our main estimation sample) and how much land the head expects to provide to that person in the future (0.33 hectares on average). We consulted the head because heads are generally the prime decision makers over inheritances. Summing the two quantities gives the total expected inheritance (0.48 hectares on average). Even if expectations are not fulfilled, we argue that it is expectations which drive behavior and decision-making at key decision points before uncertainty is revealed, justifying our focus on these.

[10] Two percent are other close relatives—mostly stepchildren or grandchildren whom the head considers to be on the same level as children.

[11] To be eligible for selection, a woreda had to contain at least one kebele in these regions' Sustainable Land Management Program. Three kebeles were then randomly selected in each woreda.

[12] For more information on sample selection and site location, see Schmidt and Tadesse (2014).

[13] We use the round 2 head because this is the round in which we collected data on all descendants of the head.

[14] We asked how much land they had received from either the household or the peasant association.

We measure migration in three ways. First, we code a dummy variable for permanent migration that takes 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 for long-distance permanent migration, which takes a value of 1 provided that the individual has permanently migrated since 2010 and, by 2014, lives outside of the woreda in which he or she resided in 2010. Finally, we code a dummy for permanent migration to an urban area, which takes a value of 1 provided that the individual has permanently migrated since 2010 and, by 2014, lives in an urban area. We focus on permanent migration rather than temporary due to the relative importance of the former in the study context.[15]

We are predominantly interested in whether individuals work in the agricultural or in the non-agricultural sector. We accordingly consider two employment outcomes: the individual's primary occupation is in the agricultural sector and the individual's primary occupation is in the non-agricultural sector. We further examine whether or not the individual's current primary occupation is attending school—indicating the choice to acquire human capital.[16]

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 subsample of those youth 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 group encompasses the vast majority of all individuals and is also the estimation sample driving the slope coefficients when we consider the logged value of land inheritance as the key explanatory variable. We apply a natural logarithmic transformation to reduce the tendency for extreme outliers to drive inferences in the regression analysis.

Panel A summarizes the outcome variables of interest. Nearly half of the youth (45 percent) had permanently migrated between survey rounds. Of these, nearly half had moved to locations outside the woreda in which they lived in 2010, and 62 percent had moved to an urban area.[17,18] The primary occupation was most often agriculture (37 percent) or in school (29 percent), but 16 percent worked in the non-agricultural sector and 13 percent did domestic work. Only 4 percent of the sample was unemployed. Looking at sector of

[15] While we documented those who were employed seasonally in a location outside of their kebele, there were too few observations (89) to consider temporary migration as an outcome.

[16] There are two other primary occupations, domestic employee and unemployed, as summarized in Table 2.

[17] These numbers come from the following calculations: $\frac{0.21}{0.45} = 0.47$ and $\frac{0.28}{0.45} = 0.62$. Note that moving out of woreda and moving to an urban area are not mutually exclusive.

[18] Our sample implies an annual out-of-woreda (district) migration rate of 5.0 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.

employment by migration status is revealing. Among those who migrated out of the woreda (long-distance), only 3 percent work in agriculture and 11 percent work in the non-agricultural sector (with the remainder studying, working as domestics, or unemployed). In contrast, among those who did not migrate out of the woreda, 29 percent work in agriculture and 8 percent work in the non-agricultural sector. The statistics are similar when we consider rural-to-urban migration instead of long-distance migration (Panel A). The average individual expected to inherit 0.48 hectare of land (Panel B).

Panel C shows that the sample is 67 percent male; this is an artifact of its demographic composition. The average age of the head at baseline is 53, well beyond the peak reproductive years of couples. Because women in Ethiopia tend to marry younger than do men—half by age 18 (Hervish, 2011)—many of the head's daughters were no longer household members at the time of the baseline survey. Thus, our findings reflect decisions made by the population of youth who reside in households led by heads entering a later phase in their life cycle. Eighty-three percent of heads were male. The descendants' average age in round 1 was 20 years, 17 percent were at least 18 years old at the time of the last land redistribution, 68 percent had finished the first educational cycle (grades 1–4), and few (5 percent) were married. A quarter of descendants had more than one male sibling directly following them in birth order. On average, descendants had 1.4 older male descendants and 1.2 older female descendants. Panel D summarizes household characteristics. Although about two-thirds of households had a metal roof, only 3 percent had an improved floor.

5 Empirical Strategy

We investigate the effect of land inheritance on youths' decisions concerning migration and sector of primary employment. 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:

$$E_{ij} = \beta_0 + \beta_1 L_{ij} + \gamma \mathbf{X}_{ij} + \alpha_j + \epsilon_{ij}, \tag{1}$$

where i indexes individuals and j households. E_{ij} denotes migration and employment indicators: employment in agriculture, employment in the non-agricultural sector, permanent migration, long-distance permanent migration, and rural-to-urban migration.[19] We denote by L_{ij} the logged expected land inheritance, $\mathbf{X}_{ij}$ is a vector of control variables, described below, and α_j are household fixed effects. Standard errors are clustered

[19] In the appendix, we instead model simultaneous choices, considering four choices of sector and location of employment: migrated long-distance and works in agriculture, migrated long-distance and works in non-agriculture, did not migrate long-distance and works in agriculture, and did not migrate long-distance and works in non-agriculture. We further examine the same four choices for the case of rural-to-urban migration instead of long-distance migration.

at the kebele level, the relevant administrative unit in which land redistribution policies are executed. We employ a linear probability model in order to accommodate the use of household fixed effects, which are important to our identification strategy (see section 5.1).[20]

5.1 Identification

A potential concern of this analysis is that the size of land inheritance is endogenous to migration, employment, and education decisions. There are several possible sources of omitted variable bias likely to bias ordinary least squares (OLS) estimates of β_1. First, across households, observed and unobserved covariates may influence both land inheritance and migration and employment decisions. One candidate is a household's land endowment and wealth; migration is costly and requires payment of up-front costs to finance it (Carrington et al., 1996). At the same time, households with larger endowments can give out larger inheritances. A second candidate is the level of tenure security of households (e.g., whether or not the household has a land use certificate); households that feel more tenure secure (i.e. have less fear of land loss and/or disputes) are more likely to feel that they have a claim to land and can give it out to descendants as inheritance. However, such land tenure security may also reduce the need for households to attach descendants to household/ family land (i.e. there is little fear of losing land simply because descendants are away), facilitating migration by those descendants. Another candidate concerns skills and networks; heads that are highly-skilled or who have strong networks and connections may find it easier to send a migrant, but these connections might also be used to foster local employment opportunities in any sector for their descendants. And a fourth candidate is experience in agriculture and knowledge of good farming practices; this know-how may have helped the household obtain more land, but could also facilitate employment in agriculture (Bezu and Barrett, 2012). While the magnitude of omitted variable bias would shrink as we added household-level controls, it would be impossible to eliminate all bias. Further, not all potential sources of omitted variable bias are observable and easy to measure. This motivated us to include household fixed effects; in doing so, we rely on within-household variation in expected land inheritances to explain within-household variation in migration and employment outcomes.

Second, within a household, parents may select descendants with particular characteristics—such as physical aptitude for or 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). Because such children face lower search costs in finding a partner,

[20] We opt for a linear probability model given concerns with including fixed effects in a nonlinear model such as a logit or probit model. These fixed effects are central to our identification strategy.

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. These potential omitted variables may bias OLS estimates in different directions. Adding to the empirical challenge, another possible source of endogeneity is reverse causality. Our measure of total land inheritance (land already received plus anticipated future land inheritance), from 2014, may itself be influenced by the employment and migration decisions already taken by youth as of 2014. A final concern is measurement error; incorrect recall, poor math skills, or simply issues of rounding could lead inheritance to be measured with error. One way of dealing with omitted variables, reverse causality, and measurement error is instrumental variables (IV) (Angrist and Pischke, 2008, 2010).

We address threats to identification in two main ways. First, we control for a number of factors that may influence both the land allocations that youth receive and their migration, employment, and educational opportunities and decisions. Second, we implement an IV strategy, constructing an instrument for individual expected land inheritance. We elaborate on each of these below.

All specifications include household fixed effects to capture all characteristics of a kebele and a household that may influence youths' decisions.[21] These include the availability of land (kebele-wide as well as within the household), laws and regulations, customs and traditions, the full local history of land redistribution, and access to agricultural and non-agricultural employment opportunities and educational institutions.

We also allow the kebele of residence at baseline to have different impacts on individuals of different gender, age, and marital status by including interactions of kebele fixed effects with a male dummy, with fixed effects for the descendant's age, and with a dummy for being married at baseline. This flexibly allows different kebeles to differentially treat males, youth at distinct ages, or the married when redistributing land.

Within households, there is variation in expected inheritance across descendants. Some of this variation may be explained by individual characteristics for which we control—being male, being the oldest male, age, marital status, being a child of the head, having completed the first cycle of primary school (up to grade 4), and being at least 18 years old at the time of the last land redistribution—which could influence the extent to which they were taken into account when the government redistributed land. The set of older descendants a youth has is also likely to influence our outcomes because older descendants are: 1) likely to inherit land and other assets ahead of the individual in question, and 2) may help younger siblings find employment

[21] In the main estimation sample, 24.5 percent of individuals come from households with a single descendant, but 75.5 percent come from households with multiple descendants.

or educational opportunities. Following Vogl (2013), we include fixed effects for the permutation of older descendants (for example, no older descendants, Boy (B)-Girl (G)-Boy (B), GB, BG, BBBB, G, and so on). Vogl (2013) argues that, with this control set, the gender of the next sibling after a descendant (conditional on having one) can be taken as if random. We also control for having more than one male sibling immediately follow oneself in birth order. In our dataset, the median male land inheritance is 60 percent greater in area than that of the median female.[22] Thus, brothers pose a larger threat to inheriting land than do sisters.

Our IV strategy leverages a unique feature of Ethiopia: land access is influenced by large-scale government efforts to redistribute land. Since the installation of Ethiopia's current government in 1991, 20 of our 27 sample kebeles experienced a large-scale land redistribution affecting a majority of households. Our in-depth interviews with kebele officials suggest that males older than 18 received priority in redistributions. This suggests that households with a greater share of their male descendants older than age 18 at the time of the redistribution should have relatively more land to allocate.

Although household fixed effects capture the average impacts of redistributions, their impacts may vary within a household. Specifically, we would expect "marginal" individuals—those at high risk of receiving very little inheritance—to benefit most from having a greater share of their male co-descendants be older than 18 at the time of the redistribution. Our data reveal one such vulnerable group: those with more than one male sibling immediately behind them in birth order, whose household head will soon after them have multiple boys reaching the age of inheritance.

We use a single interaction term as an instrument for expected land inheritance: the share of male co-descendants who were older than 18 at the time of the last land redistribution interacted with a dummy for having more than one male sibling immediately following the person in birth order.[23] Because we have one excluded instrument (an interaction term), our model is exactly identified. The instrumental variable is summarized in Table 2; its mean is 0.03. The first-stage equation states that an individual's expected land inheritance, L_{ij}, is a function of the following:

$$L_{ij} = \delta_0 + \delta_1 r_{ij} \times m_{ij} + \delta_2 m_{ij} + \theta \mathbf{X}_{ij} + \pi_j + \eta_{ij} \tag{2}$$

where r_{ij} is the share of male descendants in the household who were older than 18 at the time of the most recent land redistribution, m_{ij} is a dummy for having more than one male sibling immediately following the descendant in question, and π_j are household fixed effects.[24]

The validity of this instrument rests on a single identifying assumption: that the difference in the effect of

[22] This is despite legal provisions giving women equal rights to access, use and manage land (ANRS, 2006, 2007; ONRS, 2007).

[23] In the 7 kebeles without redistributions, we code that the share of descendants older than 18 at the time of the most recent land redistribution is 0, to reflect that none of the descendants helped the household obtain more land by virtue of their age.

[24] r_{ij} does not appear in the regression in its level form because it is collinear with the household fixed effects.

having a larger share of male descendants in the household be older than 18 at the time of land redistribution on those with vs. without more than one male sibling immediately following 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_{ij} and r_{ij}, are included in the main specification of Equation 1 (the latter through use of household fixed effects). In so doing, we avoid making the assumption that they only affect migration and employment outcomes through their effect on the size of inheritance.

A number of other papers have used interaction terms as excluded instrumental variables. For example, Nunn and Qian (2014) study the effect of US food aid on conflict in recipient countries; they use panel data to construct the interaction of last year's US wheat production and the average proportion of years over the full sample period that a country receives US food aid and use this as an instrument for the amount of food aid received by a country in a given year. Miguel et al. (2004) examine the effects of economic growth on civil conflict, experimenting with several interaction terms as instruments for growth: the interaction of current and lagged rainfall growth, the interaction of rainfall growth with the share of agricultural sector value added in national GDP, and the interaction of rainfall growth with the share of the national population that is rural. Alderman et al. (2001) consider how child health impacts child education; they use past price shocks as instruments for child health, interacting these with levels of parental education to induce variability in these shocks at the household level. And Bartik (1987) more broadly notes the usefulness of interaction terms as excluded instruments when an instrument does not have the same impact on all observations.

Table 3 (columns 1 and 2) shows that this instrument satisfies the inclusion restriction: it is a strong predictor of the size of individual i's land inheritance. In the baseline specification with the 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 weak instruments. We argue that the exclusion restriction holds because the precise timing of land redistributions in a kebele—and specifically, the difference between its effect on those with vs. without multiple male siblings immediately behind them in birth order—should be exogenous to the within-household selection mechanism determining the size of individual land inheritances.

We also experiment with several possible alternative instrumental variables in columns 3 – 8 of Table 3. Specifically, we consider new variants on m_{ij} and r_{ij}, respectively: using the *share* the next two descendants who are male in place of a *dummy* for having multiple males, and using the share of *all* descendants (not only male, but also female) who were over age 18 at the time of the last land redistribution. We show the first stages emerging from all possible combinations of these new variants on m_{ij} and r_{ij} and our original variants. We find very similar coefficients across all 8 specifications, but greater statistical significant for our

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

original instrument (columns 1 – 2); we thus use this instrument. That this instrument is stronger suggests that there are nonlinear rather than linear impacts associated with having multiple brothers immediately follow in the birth order, and that having brothers over age 18 at the time of distribution was more helpful than having sisters over age 18, from the perspective of total inheritance.

6 Results

In this section, we first estimate an OLS specification to examine the impacts of the expected size of land inheritance on migration and employment outcomes. We next present IV estimates that help us interpret these estimates as causal; IV results largely support the OLS results. Exploratory OLS analysis using subsets of the sample (for which we are unable to carry out IV analysis given problems of weak instruments) helps us ascertain how land inheritance as a predictor of migration and employment decisions varies with gender, age, and three mediating factors: the prevalence of land rental and thus quality of land rental markets, proximity to a major urban center, and soil fertility.

6.1 OLS Estimates

Table 4, Panel A, provides 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 expected land inheritance, in hectares. We present specifications with (even-numbered columns) and without (odd-numbered columns) the full control set; all specifications include household fixed effects.

In our preferred specification with the full set of controls, a 10 percent increase in a youth's land inheritance is associated with a 1.6 percentage point decrease in his or her probability of permanent migration.[26] 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 with less permanent migration to urban areas in particular. These findings are present regardless of whether the full control set is included. A 10 percent 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 results indicate an 8.9 percent and a 7.9 percent reduction in long-distance permanent and rural-to-urban permanent migration, respectively. While receiving a land inheritance is associated with less migration, the magnitude of its impacts are particularly large for long-distance and rural-to-urban migration.

[26] Given the 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 $\times$ $ln(1.1)$.

Table 4, Panel B, presents OLS results from regressions of dummies for primary employment in agriculture (columns 1–2), primary employment in non-agriculture (columns 3–4), and primary status as a student (columns 5–6) on the logged amount of expected land inheritance in hectares. The likelihood of being primarily employed in agriculture is significantly larger for those who have inherited or expect to inherit land, regardless of whether the full control set is included. In our preferred specification with the 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 primary employment in 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). Although land inheritance is negatively correlated with being a student, the correlation is not robust to the inclusion of the full control set.[27]

While a full 71 percent of sample youth expect to inherit land, 29 percent did not and are accordingly omitted from our regressions, which log land inheritance and thus omit 0s. We explore whether or not their omission is consequential for our main findings by considering two alternate outcomes: a dummy for having inherited or expecting to inherit land (takes on 1 for all with positive expectations, and 0 for the 29 percent not inheriting land) (Appendix Table A2), and total land inheritance in hectares (not logged) (Appendix Table A3). Our main findings are unchanged; land inheritance predicts less migration—especially long-distance and rural-to-urban migration—and predicts that youth will work in agriculture as opposed to other sectors. Finally, we show that our results are robust to using data collected from descendants themselves on whether or not they expected to inherit land (Appendix Table A4). These data are often missing for migrants and thus yield a smaller and non-representative sample, but show the same broad pattern of results.

6.2 IV Estimates

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

Table 5, Panel A, compares the 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 with migra-

[27] For both the migration and employment outcomes, we obtain similar results (available on request) when we instead measure land access with a dummy for whether or not an individual is expected to inherit land.

tion (columns 4–6). The IV estimates[28] 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 figures 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 (columns 1–3) with IV estimates (columns 4–6) of the impacts of the size of land inheritance on employment outcomes. The significant, positive impact of inheriting more land on employment in agriculture is now even larger in magnitude and more statistically significant; 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 land inheritance 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 inheritance leads to a 4.1 percentage point increase in employment in the non-agricultural sector, or 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 the choice of whether or not to study.[29]

6.3 IV Placebo Test

A potential concern with the 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 the first stage, but rather the order in which kebeles experienced such a redistribution (with that order potentially being endogenous to factors influencing youth employment and migration decisions).[30] The 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 $k \in (-\infty, \infty)$. We carry out this placebo analysis in Figure 2,

[28] We use the Stata package –xtivreg2– written by Schaffer (2010).

[29] Appendix Table A5 considers whether our results are robust to considering the decision of the sector and the location in which to work jointly using four outcomes: migrated long-distance and works in agriculture, migrated long-distance and works in non-agriculture, did not migrate long-distance and works in agriculture, and did not migrate long-distance and works in non-agriculture. Inheriting more land is always correlated with a higher likelihood of staying in the woreda to work in agriculture (statistically significant at the 1 percent level in both OLS and IV results) and with a lower likelihood of any of the other three outcomes. In the case of the IV results, these findings are always statistically significant at conventional levels, with the exception on the outcome of staying in the woreda to work in non-agriculture. Appendix Table A6 presents analogous results instead considering rural-to-urban migration as opposed to long-distance migration, and shows substantially similar findings.

[30] 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.

for integer values of $k \in (-15, 15)$, plotting k on the x-axis and the F statistic of the excluded instrument in the main specification (column 2 of Table 3) on the y-axis. We see that the F statistic is maximized when $k = 0$ (that is, 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.[31,32] 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 vs. late redistributions, that is driving the strong first-stage results.

6.4 Estimates by Gender and Age

Although 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 the sample are most driving the results. Of special importance are the differential impacts on men vs. women, and on youth of below-median (15 to 19) vs. above-median (20 to 34) age. As cultural and social norms often disfavor women in land inheritance (Fafchamps and Quisumbing, 2002) and in educational and employment 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 make major migration and employment decisions in response to an inheritance, while older youth may be at critical junctures at which land strongly influences decision-making.

Unfortunately, we face problems of weak instruments when we split the sample, and thus must estimate an OLS model.[33] However, to the extent that the bias in the OLS estimates is uncorrelated with gender, the relative size of the coefficients on land inheritance for men vs. for women is informative. Table 6, Panel A, estimates a model that interacts all explanatory variables with gender; this allows us to compare how well land inheritance predicts migration and employment outcomes for men vs. women and to test for any statistically significant differences.

What is immediately apparent is that men drive the results for migration. Land inheritance is not a significant predictor of permanent migration by women, but it predicts a significantly lower likelihood

[31] The Stock-Yogo critical value for 10 percent maximal IV size for a Cragg-Donald F statistic is 16.38 in our main specification.

[32] Further, the four other "sufficiently high" F statistics occur at $t-5, t-4, t-3$, and $t-2$; this may be because redistribution policies in some kebeles favor not those older than 18, but rather those older than age 23 (or 22, or 21, or 20).

[33] Due to degrees-of-freedom considerations in 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 $\times$ gender, kebele $\times$ marital status, and kebele $\times$ age fixed effects.

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 agriculture for both genders, though this finding is statistically significantly larger in magnitude for men. That is, increasing a man's inheritance increases his likelihood of working in agriculture more than it increases a woman's chances. Although inheriting more land predicts a lower probability of working in the non-agricultural sector for both genders, this finding is statistically significant only for men. A small land inheritance may drive men 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.

Panel B of Table 6 estimates a model that interacts the full set of individual-level controls with a dummy for being 20 years old or older—the median age in our sample. We see that the migration results are mostly driven by those aged 20–34 (older youth), as are reductions in employment in the non-agricultural sector. However, land inheritance predicts similar increases in employment in agriculture for both groups. Neither age group is less likely to be a student as a result of inheriting more land; in general, 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 finding is consistent with the overall low prioritization of education among rural households in Ethiopia relative to other countries (Dillon and Barrett, 2014). Overall, these findings are consistent with older youth being those most vulnerable to having their decisions impacted by land inheritance, while the relatively young are not yet making major life decisions in response to an expected inheritance. On the other hand, it could also indicate that there is greater uncertainty surrounding the land inheritance expectations of the very young, as compared to their older co-descendants.

6.5 Estimates by Rental Markets, Proximity to Urban Center, and Soil Fertility

It is unlikely that land inheritance has the same impact on youths' decisions in all settings. In particular, various factors may influence the costs and benefits associated with employment and migration decisions, thus moderating the relationship between inheritance and these decisions. We identify three such factors: the prevalence of land rental and thus the quality of land rental markets, proximity to a major urban center, and soil fertility. We differentiate kebeles with relatively low land rental activity from those with relatively high land rental activity by examining whether a kebele is below or above the median in terms of the share of households renting out land. We distinguish kebeles that are relatively close to and far from a major urban center by dividing kebeles into those that are below and above the median in terms of travel times, respectively.

(Following the Ethiopia Central Statistical Agency, we define major urban centers as all regional capitals plus other cities with populations of 100,000 or more in 2007 (Central Statistical Agency of Ethiopia (CSA), 2014)).[34] And we divide kebeles into those with relatively low-quality and high-quality soil by considering whether the kebele is below or above median in terms of the share of owned land that has either mixed or high quality soil, as opposed to low quality soil. Use of kebele-level averages helps reduce concerns related to the endogeneity of household-level data.

Dummies for living in a kebele with above-median land rental markets, above-median proximity to a major urban center, or above-median soil quality are clearly collinear with our household fixed effects; we are thus unable to estimate their individual impacts on migration and employment outcomes. Instead, we are interested in estimating whether land inheritance interacted with these kebele-level dummies is statistically significant. That is, does the impact of receiving a large land inheritance vary according to how rich are land rental markets, how close is an urban center, or how high is soil quality? Again, we estimate a model by OLS that interacts the full set of individual-level controls with one of these three dummies.[35]

As shown in Table 7, the size of land inheritance is a more powerful predictor of spatial and sectoral location decisions in areas with less vibrant land rental markets (Panel A), in areas further from major urban centers (Panel B), and in places with lower soil fertility (Panel C). We consider each of these in turn.

First, where land rental market activity is low (below the 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 that seen in areas with richer rental markets. Rental may be a viable alternative to inheritance, but where such markets are thin, youth not inheriting land tend to migrate and enter the non-agricultural sector in higher numbers. This evidence is consistent with the partial substitutability of inherited land access via land rental markets.

As these are OLS estimates (given that our excluded instrument is weak in sub-samples), they may be affected by the endogeneity of land rental markets to employment and migration decisions. Arguably the most likely source of endogeneity comes from the fact that places with vibrant land markets are also likely to be places in which land scarcity is high; scarcity creates value, and this value (demand) stimulates the creation of markets. However, where land is scarce and thus more valuable, we would expect inheritance to exhibit a relatively *greater* pull on individuals, making them even more likely to stay in agriculture and forgo migration. This source of endogeneity would accordingly bias us *against* finding the results that we do—i.e. that inheritance exhibits a lesser pull to stay in agriculture (and forgo migration) when land markets are more vibrant. Even if the magnitude of our estimates is wrong, our broad conclusion about the likely partial

[34] The 26 cities range in size from 20,824–3,156,057 and have a median population of 110,086 (Appendix Table A7 lists them).

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

substitutability of inheritance and rental land is thus likely to hold.

Travel time to a major urban center appears to matter as well; for those far away (with greater than 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, than 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.

Finally, where soil quality 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 that seen in areas with higher quality soil. This is consistent with youth requiring more land to attract them to stay at home (and not work in the non-agricultural sector) when soil is of poorer quality (a quantity-quality trade-off).

7 Discussion

We find strong relationships between expected land inheritance and youths' (ages 15–34) likelihood of engaging in long-distance permanent migration, rural-to-urban permanent migration, 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 inheritance 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-to 34-year-old sub-populations. The period from 20 to 34 years of age is crucial because it is the stage of the life cycle when individuals typically form new households. The fact that the employment decisions of older youth are most susceptible to expected land inheritance evokes the African concept of *waithood* (Honwana, 2012), whereby older youth postpone major employment decisions until they attain financial independence.

We additionally examine whether our main effects are significantly different in communities with varying levels of three mediating factors that might influence the costs of migration, opportunity costs, and barriers to entry into the non-agricultural sector: the quality of land rental markets, travel time to a major urban center, and soil quality. This analysis offers suggestive evidence on the contexts in which land inheritance is likely to matter most for youth decision-making.

First, access to land rental markets 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). These results highlight youth preferences to use migration or non-agricultural employment as a last resort after exhausting other means of accessing land (such as rental markets). It also supports the notion that rural inhabitants diversify sectorally (Schmidt and Bekele, 2016), particularly in areas constrained by land availability, rather than exit agriculture altogether.

Second, a reduction in either moving costs or search costs, captured by being closer to an urban area, may mediate the effect expected inheritance has on employment 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 negligible 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, such as under periods of income variability (Gray and Mueller, 2012) or land scarcity (Bezu and Holden, 2014; Deininger et al., 2007). We show that when land constraints on youth in remote areas are relaxed, their proclivity to engage in long-distance migration or rural non-farm employment is greatly reduced.

Finally, a lower-quality land inheritance, captured by poor soil quality, may mediate the relationship between inheritance and employment and migration decisions. When land is of lower quality, more of it may be necessary to produce the same output. Even a small reduction in one's inheritance may push households to the point at which staying at home and working in agriculture is not as profitable as other opportunities. Indeed, we find that where soil quality 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 that seen in areas with higher quality soil.

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 service and manufacturing sectors, will be crucial to absorb youth with limited opportunities for land ownership. The government has signaled its commitment to the latter under its Five-Year Growth and Transformation Plan (2015/2016–2019/2020) (Schmidt and Bekele, 2016). Finally, there is a growing need to initiate modernization in the agricultural sector by increasing access to extension and encouraging widespread adoption of agricultural technologies. 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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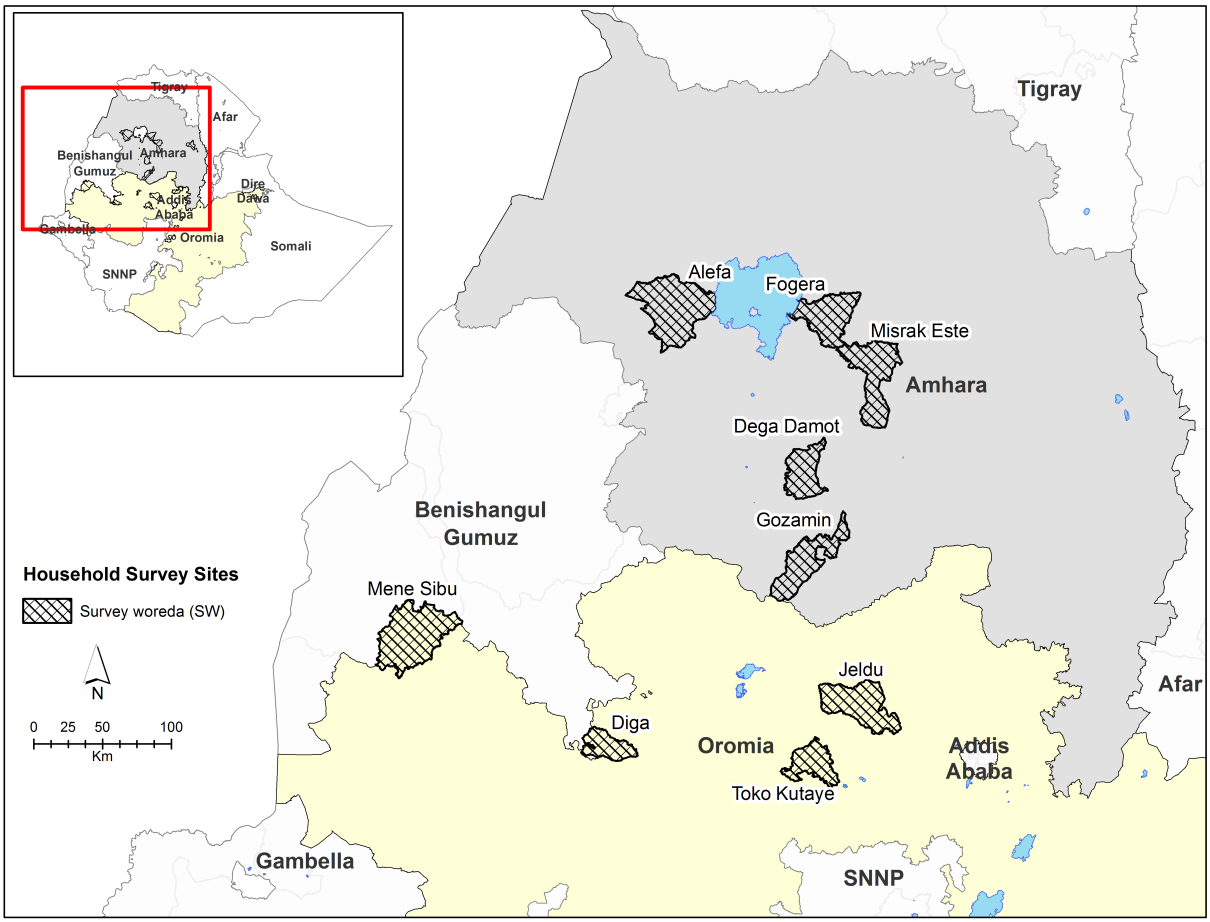
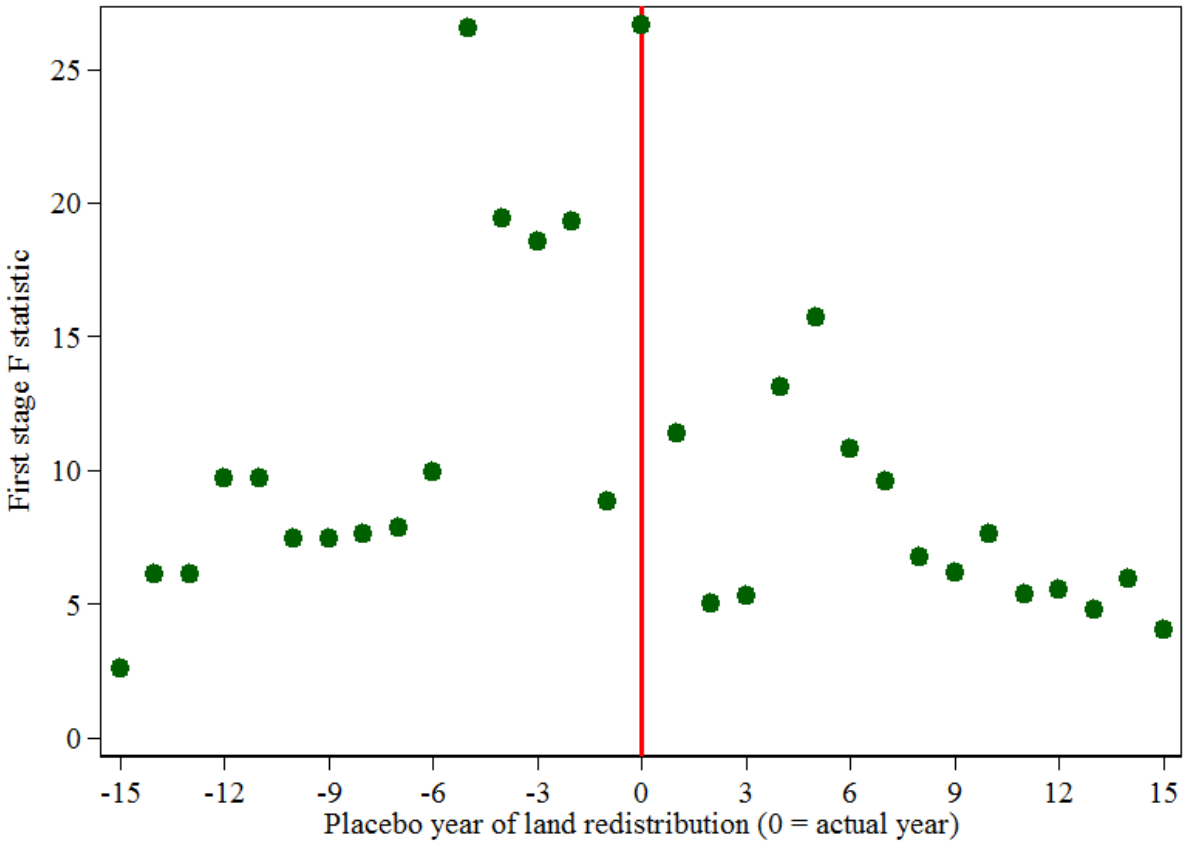
Figure 1: Spatial distribution of survey sites



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

Figure 2: 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 the excluded instrument (from estimating column 3 of Table **??**). The vertical line at $x = 0$ highlights the value of the F statistic when the calculation uses the actual year of land redistribution.

Table 1: Observations by year 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 nonzero expected land inheritance		
Variable	Mean	SD	N	Mean	SD	N
Panel A: Outcomes						
Dummy—permanent migrant	0.53	0.50	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	1,713	0.37	0.48	1,167
In non-agriculture	0.19	0.40	1,713	0.16	0.36	1,167
As a student	0.30	0.46	1,713	0.29	0.45	1,167
Domestic	0.13	0.34	1,713	0.13	0.34	1,167
Unemployed	0.04	0.19	1,713	0.04	0.19	1,167
Dummy—did not permanently migrate out of woreda & occupation is in ...						
Agriculture	0.29	0.46	1,705	0.35	0.48	1,164
Non-agriculture	0.08	0.27	1,705	0.07	0.26	1,164
Dummy—permanently migrated out of woreda & occupation is in ...						
Agriculture	0.03	0.16	1,705	0.02	0.13	1,164
Non-agriculture	0.11	0.32	1,705	0.09	0.28	1,164
Dummy—did not permanently migrate to urban area & occupation is in ...						
Agriculture	0.30	0.46	1,705	0.35	0.48	1,164
Non-agriculture	0.06	0.23	1,705	0.06	0.23	1,164
Dummy—permanently migrated to urban area & occupation is in ...						
Agriculture	0.02	0.12	1,705	0.02	0.12	1,164
Non-agriculture	0.13	0.34	1,705	0.10	0.30	1,164
Panel B: Land access						
Dummy—inherited or expects to inherit land	0.71	0.45	1,717	1.00	0.00	1,170
Total land inheritance (hectares)	0.34	2.14	1,671	0.48	2.54	1,170
Land already inherited (hectares)	0.11	1.84	1,716	0.15	2.22	1,170
Additional land inheritance anticipated (hectares)	0.23	1.02	1,672	0.33	1.21	1,170
Log land inheritance	-1.36	0.92	1,170	-1.36	0.92	1,170
Panel C: Individual controls						
Dummy—male	0.64	0.48	1,717	0.67	0.47	1,170
Age	19.9	4.05	1,717	19.9	4.09	1,170
Dummy—child of head	0.97	0.16	1,717	0.98	0.13	1,170
Dummy—married	0.05	0.21	1,717	0.05	0.23	1,170
Dummy—> 1 male descendant immediately follows in birth order	0.25	0.44	1,717	0.25	0.43	1,170
Number of older male direct descendants	1.38	1.49	1,717	1.37	1.48	1,170
Number of older female direct descendants	1.18	1.38	1,717	1.17	1.38	1,170
Dummy—age 18+ at time of land redistribution	0.18	0.38	1,717	0.17	0.38	1,170
Dummy—completed cycle 1 of primary school (grade 4)	0.70	0.46	1,717	0.68	0.47	1,170
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 land that household describes as having high or mixed soil quality	83.3	25.5	832	85.2	24.0	625
Share of males 18+ at time of land redistribution	0.17	0.29	834	0.17	0.30	625
Panel E: Instrument						
Excluded instrument*	0.03	0.11	1,717	0.02	0.1	1,170

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

Notes: *The share of male descendants who were older than 18 at the time of the redistribution interacted with a dummy for having more than one male descendant immediately following oneself. *Land redistribution* always refers to the most recent redistribution. *With land* refers to those who either have already inherited 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 descriptive statistics. Religion is that of the household head.

Table 3: IV first-stage results

	Outcome: Log land inheritance							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Excluded instrument: Dummy for > 1 male descendant immediately following in birth order×share of **male** descendants 18+ at time of land redistribution	2.501***	2.478***						
	(0.460)	(0.480)						
Excluded instrument: Dummy for > 1 male descendant immediately following in birth order×share of descendants 18+ at time of land redistribution			3.307***	3.287***				
			(0.641)	(0.642)				
Excluded instrument: Share of male descendants among the 2 descendants immediately following in birth order×share of **male** descendants 18+ at time of land redistribution					2.787*	2.804*		
					(1.595)	(1.613)		
Excluded instrument: Share of male descendants among the 2 descendants immediately following in birth order×share of descendants 18+ at time of land redistribution							2.724	2.737
							(2.269)	(2.284)
Dummy for > 1 male descendant immediately following in birth order	-0.082	-0.079	-0.096	-0.094				
	(0.061)	(0.065)	(0.069)	(0.075)				
Share of male descendants among the 2 descendants immediately following in birth order					0.080	0.089	0.119	0.126
					(0.151)	(0.139)	(0.152)	(0.139)
Observations	1,170	1,170	1,170	1,170	1,011	1,011	1,011	1,011
R-squared	0.902	0.902	0.903	0.903	0.909	0.910	0.906	0.907
Number of households	625	625	625	625	557	557	557	557
First-stage F stat	29.59	26.63	26.65	26.24	3.05	3.02	1.44	1.44
Full set of individual-level controls?	No	Yes	No	Yes	No	Yes	No	Yes

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

Notes: The share of male descendants among the 2 descendants immediately following in birth order takes a value of 0, $\frac{1}{2}$, 1, or missing if there are fewer than two descendants following in the birth order. All specifications include fixed effects for exact permutation of older sibling sex, for kebele × age fixed effects, for kebele × marital status, and for kebele × gender. Individual-level controls include dummies for being a child of the head of household, for being at least 18 years old 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 statistic is the t-statistic on the excluded instrument squared. Standard errors are in parentheses and clustered at the kebele level. *** indicates p<0.01; ** indicates p<0.05; and * indicates p<0.10.

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. *** indicates p<0.01; ** indicates p<0.05; and * indicates p<0.10.

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	In non-agriculture	As a student	In agriculture	In non-agriculture	As a 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. *** indicates p<0.01; ** indicates p<0.05; and * indicates p<0.10.

Table 6: Analysis of impacts of size of land inheritance on migration and employment outcomes by gender and by age (OLS)

	Dummy - migrated ...			Dummy - primarily employed ...		
	Anywhere	Out of woreda	To urban area	In agriculture	In non-agriculture	As a 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. *** indicates p<0.01; ** indicates p<0.05; and * indicates p<0.10.

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

	Dummy–migrated ...			Dummy–primarily employed ...		
	Anywhere	Out of woreda	To urban area	In agriculture	In non-agriculture	As a 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
Panel C: By kebele soil quality						
Log land inheritance (lower quality)	-0.327*	-0.318***	-0.569***	0.338**	-0.493*	0.263
	(0.171)	(0.090)	(0.129)	(0.125)	(0.243)	(0.324)
Log land inheritance (higher quality)	-0.182	-0.350**	-0.269***	0.373***	-0.00130	-0.314*
	(0.139)	(0.149)	(0.0808)	(0.123)	(0.137)	(0.157)
Observations	1,170	1,167	1,167	1,167	1,167	1,167
R-squared	0.830	0.849	0.856	0.865	0.826	0.845
Number of households	625	624	624	625	625	625
P-value of difference	0.516	0.857	0.059	0.846	0.089	0.121

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's being greater than or less than (respectively) the median travel time (107 minutes) to a major urban center (regional capital or city with a population of 100,000 or more in 2007). For the soil quality models, the share of land that is "fertile" or "mixed" quality (as reported) is calculated for each kebele. This share ranges from 55.8% to 99.8%. A soil quality dummy is constructed for a kebele having more than the median (85%) kebele. Estimates are from completely interacted models in which rental market activity, distance, and soil quality 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 old 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. *** indicates p<0.01; ** indicates p<0.05; and * indicates p<0.10.

8 Appendix Tables

Table A1: Descriptive statistics for sample with nonzero expected land inheritance, by sex

	Men			Women		
Variable	Mean	SD	N	Mean	SD	N
Panel A: Outcomes						
Dummy—permanent migrant	0.42	0.49	779	0.51	0.50	391
Dummy—permanent migrant out of woreda	0.22	0.41	776	0.20	0.40	391
Dummy—permanent migrant to urban area	0.26	0.44	776	0.31	0.46	391
Primary occupation is...						
In agriculture	0.50	0.5	777	0.11	0.31	390
In non-agriculture	0.19	0.39	777	0.10	0.30	390
As a student	0.27	0.44	777	0.33	0.47	390
Domestic	0.00	0.00	777	0.4	0.49	390
Unemployed	0.03	0.18	777	0.05	0.21	390
Dummy—did not permanently migrate out of woreda & occupation is in ...						
Agriculture	0.48	0.50	774	0.10	0.30	390
Non-agriculture	0.08	0.27	774	0.06	0.24	390
Dummy—permanently migrated out of woreda & occupation is in ...						
Agriculture	0.02	0.15	774	0.01	0.07	390
Non-agriculture	0.11	0.32	774	0.04	0.19	390
Dummy—did not permanently migrate to urban area & occupation is in ...						
Agriculture	0.48	0.50	774	0.10	0.30	390
Non-agriculture	0.06	0.24	774	0.04	0.20	390
Dummy—permanently migrated to urban area & occupation is in ...						
Agriculture	0.02	0.14	774	0.01	0.07	390
Non-agriculture	0.13	0.33	774	0.06	0.23	390
Panel B: Land access						
Dummy—inherited or expects to inherit land	1.00	0.00	779	1.00	0.00	391
Land inheritance total (hectares)	0.43	0.55	779	0.59	4.33	391
Land inheritance inherited (hectares)	0.11	0.42	779	0.22	3.79	391
Land inheritance expected (hectares)	0.31	0.37	779	0.37	2.03	391
Log land inheritance	-1.28	0.92	779	-1.52	0.91	391
Panel C: Individual Controls						
Dummy—male	1.00	0.00	779	0.00	0.00	391
Age	20.1	4.11	779	19.6	4.04	391
Dummy—child of head	0.99	0.1	779	0.97	0.17	391
Dummy—married	0.06	0.24	779	0.04	0.19	391
Dummy—> 1 male descendant immediately follows in birth order	0.24	0.43	779	0.28	0.45	391
Number of older male direct descendants	1.30	1.45	779	1.52	1.54	391
Number of older female direct descendants	1.15	1.37	779	1.23	1.41	391
Dummy—Age 18+ at time of land redistribution	0.18	0.39	779	0.16	0.36	391
Dummy—completed cycle 1 of primary school (grade 4)	0.72	0.45	779	0.62	0.49	391

Source: Authors' calculations based on IFPRI's Watershed Surveys of 2010 and 2014.
Notes: *The share of male descendants who were older than age 18 at the time of the redistribution interacted with a dummy for having more than one male descendant immediately following oneself. *Land redistribution* always refers to the most recent redistribution. *With land* refers to those who either have already inherited 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 descriptive statistics. Religion is that of the household head.

Table A2: OLS results showing how a dummy for expecting to inherit land predicts migration and employment decisions

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Migration						
	Dummy - migrated ...					
	Anywhere		Out of woreda		To urban area	
Dummy - inherited or expects to inherit land	-0.394***	-0.312***	-0.312***	-0.196**	-0.303***	-0.254***
	(0.060)	(0.073)	(0.063)	(0.080)	(0.055)	(0.080)
Additional controls	No	Yes	No	Yes	No	Yes
Observations	1,717	1,717	1,709	1,709	1,709	1,709
R-squared	0.081	0.684	0.057	0.672	0.055	0.677
Number of households	834	834	833	833	833	833
Panel B: Occupation						
	Dummy - primarily employed ...					
	In agriculture		In non-agriculture		As a student	
Dummy - inherited or expects to inherit land	0.343***	0.153*	-0.229***	-0.124	-0.065	-0.119
	(0.052)	(0.081)	(0.055)	(0.076)	(0.071)	(0.089)
Additional controls	No	Yes	No	Yes	No	Yes
Observations	1,713	1,713	1,713	1,713	1,713	1,713
R-squared	0.058	0.721	0.034	0.667	0.002	0.672
Number of households	834	834	834	834	834	834

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, for kebele × marital status, and for kebele × gender. Standard errors are in parentheses and clustered at the kebele level. *** indicates p<0.01; ** indicates p<0.05; and * indicates p<0.10.

Table A3: OLS results showing how the amount of land inheritance in hectares predicts migration and employment decisions

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Migration						
	Dummy - migrated ...					
	Anywhere		Out of woreda		To urban area	
Total land inherited or expected	0.012***	-0.191	-0.004	-0.326**	-0.004	-0.360**
	(0.002)	(0.121)	(0.004)	(0.120)	(0.004)	(0.134)
Additional controls	No	Yes	No	Yes	No	Yes
Observations	1,671	1,671	1,665	1,665	1,665	1,665
R-squared	0.003	0.674	0.000	0.677	0.000	0.674
Number of households	814	814	813	813	813	813
Panel B: Occupation						
	Dummy - primarily employed ...					
	in agriculture		in non-agriculture		as a student	
Total land inherited or expected	0.009	0.255**	-0.002	-0.257**	-0.016***	-0.145
	(0.009)	(0.100)	(0.003)	(0.111)	(0.003)	(0.127)
Additional controls	No	Yes	No	Yes	No	Yes
Observations	1,667	1,667	1,667	1,667	1,667	1,667
R-squared	0.001	0.719	0.000	0.681	0.005	0.679
Number of households	814	814	814	814	814	814

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. *** indicates p<0.01; ** indicates p<0.05; and * indicates p<0.10.

Table A4: OLS results using self-reported land inheritance data showing how a dummy for expecting to inherit land predicts migration and employment decisions

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Migration						
	Dummy - migrated ...					
	Anywhere		Out of woreda		To urban area	
Dummy - inherited or expects to inherit land	-0.460***	-0.255*	-0.372***	-0.305**	-0.359***	-0.330***
	(0.064)	(0.129)	(0.064)	(0.117)	(0.065)	(0.096)
Additional controls	No	Yes	No	Yes	No	Yes
Observations	1,274	1,274	1,268	1,268	1,268	1,268
R-squared	0.099	0.731	0.087	0.741	0.079	0.722
Number of households	590	590	589	589	589	589
Panel B: Occupation						
	Dummy - primarily employed ...					
	In agriculture		In non-agriculture		As a student	
Dummy - inherited or expects to inherit land	0.356***	0.307***	-0.148**	-0.030	0.004	-0.156
	(0.048)	(0.108)	(0.061)	(0.106)	(0.057)	(0.131)
Additional controls	No	Yes	No	Yes	No	Yes
Observations	1,269	1,269	1,269	1,269	1,269	1,269
R-squared	0.061	0.765	0.016	0.738	0.000	0.747
Number of households	590	590	590	590	590	590

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, for kebele × marital status, and for kebele × gender. Standard errors are in parentheses and clustered at the kebele level. *** indicates p<0.01; ** indicates p<0.05; and * indicates p<0.10.

Table A5: Comparison of OLS and IV results, showing how the amount of land inheritance predicts sector of employment among those who did and did not migrate long-distance

	(1)	(2)	(3)	(4)
	Dummy - did not migrate out of the woreda and works in ...		Dummy - migrated out of the woreda and works in ...	
	Agriculture	Non-agriculture	Agriculture	Non-agriculture
Panel A: OLS				
Log land inheritance	0.300***	-0.089	-0.037	-0.090
	(0.101)	(0.068)	(0.030)	(0.090)
Observations	1,164	1,164	1,164	1,164
R-squared	0.815	0.762	0.822	0.737
Number of households	624	624	624	624
Panel B: IV				
Log land inheritance	0.761***	-0.121	-0.105*	-0.306**
	(0.175)	(0.093)	(0.059)	(0.120)
Observations	876	876	876	876
R-squared	0.792	0.761	0.811	0.723
Number of households	624	624	624	624
First Stage F-Stat	22.61	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. Of the 624 households that are in our sample, 288 have a single descendant in our sample. Those households do not contribute to the slope coefficient on log land inheritance. 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. *** indicates p<0.01; ** indicates p<0.05; and * indicates p<0.10.

Table A6: Comparison of OLS and IV results, showing how the amount of land inheritance predicts sector of employment among those who did and did not migrate to an urban area

	(1)	(2)	(3)	(4)
	Dummy - did not migrate to an urban area and works in ...		Dummy - migrated to an urban area and works in ...	
	Agriculture	Non-agriculture	Agriculture	Non-agriculture
Panel A: OLS				
Log land inheritance	0.269***	-0.083	-0.007	-0.097
	(0.096)	(0.056)	(0.027)	(0.104)
Observations	1,164	1,164	1,164	1,164
R-squared	0.813	0.737	0.827	0.737
Number of households	624	624	624	624
Panel B: IV				
Log land inheritance	0.626***	-0.145	0.030	-0.282**
	(0.167)	(0.106)	(0.019)	(0.136)
Observations	876	876	876	876
R-squared	0.799	0.735	0.824	0.729
Number of households	624	624	624	624
First Stage F-Stat	22.61	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. Of the 624 households that are in our sample, 288 have a single descendant in our sample. Those households do not contribute to the slope coefficient on log land inheritance. 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. *** indicates p<0.01; ** indicates p<0.05; and * indicates p<0.10.

Table A7: Major urban center populations, Ethiopia, 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: Central Statistical Agency of Ethiopia (CSA) (2014)