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The Effect of Land Inheritance on Youth Migration and Employment Decisions in Rwanda

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Abstract: There is growing mobility of rural youth mainly caused by limited access to land resources and inadequacy of job opportunities. Increased population density coupled with low education rates has increased pressure on natural resources, especially land. This paper assessed the effect of land inheritance on youth migration and employment in Rwanda using the 2010/11 and 2013/14 Integrated Household Living Conditions Surveys (EICVs) data collected from 8160 households by the National Institute of Statistics of Rwanda (NISR). In-depth key informant interviews and focus group discussions, at institutional and cooperative levels, were conducted to supplement and support survey results. We used the Hausman test to choose between the fixed-effects and random-effects models. Results show that land inheritance has a negative and statistically significant effect on youth migration and non-agriculture-based employment. This implies that greater access to land through inheritance reduces the likelihood of youth migration and their participation in nonagricultural employment. The paper concludes with implications for policy aimed at creating increased access to land, expanding youth employment opportunities in rural areas, and reducing rural–urban youth migration.

Keywords: access to land; rural youth; youth migration; youth employment; Rwanda

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1. Introduction

Land is a valuable asset for improving livelihoods and alleviating poverty among vulnerable groups such as women and youth, especially those residing in rural areas [1–3]. Access to land has a direct linkage with poverty reduction and improving food and nutrition security [4]. Land remains the main source of livelihood for about 62% of rural people in sub-Saharan Africa (SSA) [1] and 61.3% in Rwanda [5]. However, land is becoming a scarce resource due to rapid population growth [6]. The continuous growth in rural population and families is typically related to a lack of access to agricultural land for family descendants, especially youth [7].

Globally, access to land is well-reiterated in the newly released United Nations (UN) Sustainable Development Goals (SDGs) as it is linked to poverty reduction and improving food and nutrition security [4,8]. However, in Africa, the landholding structure is inequitable and needs improvement so that women and youth can obtain access to land [9]. Access to land for rural women is a major priority under the African Union Agenda 2063 [10]. In addition, the Malabo Declaration on Accelerated Agricultural Growth and

Transformation (2014) pointed out that land policies should be focused on achieving agricultural transformation with equitable access to land and secure land rights [11]. The newly released Rwanda National Land Policy suggested that acquiring land through purchasing or getting it via the government is the remaining option, as access to land through inheritance is becoming very limited [12].

In Africa, the youth population aged between 15 and 24 is estimated at 226 million, roughly 20% of the global youth population [13], whereas in SSA, the population under the age of 25 years reaches 62% [14]. Generally, African youth gain access to land through customary tenure systems (or inheritance), purchase, rental, and government [15]. However, access to land among youth remains critical due to small pieces of land owned by families, lack of financial ability required to purchase land, and lack of legal protection of land rights in case land-related conflicts are raised [1,16,17].

These constraints discourage rural youth and force them to search for alternative sources of livelihood [2,18]. Lack of access to land is linked to less participation of youth in agriculture activities [19,20]. In Africa, cultural norms and customs prioritize young men over young women when it comes to granting land rights [21]. The exclusion of young women is linked to the fact that valuable assets inherited/granted by young women are used for the benefits of their husbands' family, not necessarily their native families [22]. Though it is evidenced that rural youth do not have adequate access to land, considering youth voices when developing land policies seems to be one of the main solutions to tackle issues related to lack of access to land [23].

The literature suggests that the unemployment rate among young Africans has become critical and debatable [20,24], though 10 to 12 million youth enter the labor market every year [25]. High unemployment of 11% in SSA is repeatedly related to the high dependence on subsistence agriculture which does not make any economic return [18]. Access to land resources declines the rate of unemployment among people who rely entirely on land. Lack of access to land is one of the driving factors that push youth to the area that could economically transform their lives [26,27].

Studies also argue that having no rights over productive assets such as land is associated with youth's decision to quit farming activities and move to an area with various livelihood options [7,28]. The study by [29] suggested that the deprivations youth and women face in accessing productive resources such as land influence their decision to seek nonagriculture employment and migrate out of remote areas. Using the household fixed-effects models [29] revealed that access to land increased the incidence of employment in agriculture, and the size of land inherited by youth is associated with less migration. The study by [24] confirmed that youth's decision concerning the type of employment to engage in and where to move is determined by the level of youth's access to land. Moreover, the study by [30] underlined difficulties in having access to land among young women in rural areas due to societal or cultural norms and beliefs.

Rwanda is a landlocked country, with arable land estimated to be 48% of the total area of 26,338 km^2 [31]. Its population is estimated at 11,893,443, of which 26.6% is aged between 16 and 30 years [5]. Access to adequate land for cultivation remains critical, especially for the youth. About 55.6% of the households cultivate less than 0.3 ha, 3.9% cultivate from 0.3 to 0.9 ha, 11.1% from 0.9 ha to 3 ha, and 1.4% cultivate more than 3 ha [32]. Similarly, the study by [33] argued that limited land rights are unceasingly posing problems among Rwandan women and youth. However, the government of Rwanda grants land to its citizens and establishes land law that determines modalities of concession, transfer, and use of land [34]. Recently, the national land policy stated that access to land through inheritance is becoming very limited due to land shortage. The foremost options to acquire land were found to be rental, purchasing, and governmental [12]. Additionally, recent evidence pointed out that trends such as decline in importance of customary institutions and the commodification of land could help in improving youth's access to land [35].

Efforts have been made in analyzing how youth's limited access to land influences their engagement in agriculture, entrepreneurship, and decision to migrate [16,29,36,37]. A

study on land inheritance and youth's migration in Ethiopia indicated that youth that have large expectations to inherit land were unlikely to migrate to farther places permanently. The authors asserted that youth with high expectations to inherit land were likely to prefer agricultural careers [7]. In Zambia, evidence revealed that high-productive areas with established commercial agriculture had low rates of youth out-migration [38]. There is little evidence on how land inheritance systems shape youth access to land and their decisions regarding migration and employment in agriculture in Rwanda. The evidence so far is limited to a few studies' assessments on gendered access to land [23,39,40]. Especially, there is a lack of empirical analysis on the effect of land access on youth migration and employment decisions in Rwanda. Such evidence would help in understanding the linkage of access to land and migration decision among youth and inform "youth-friendly" policies and program decisions. Therefore, this paper aims to assess the extent to which youth access to land through inheritance drives their migration and employment decisions. This study aims to contribute to the literature on land access, migration, and employment in sub-Saharan Africa by taking advantage of a unique panel household dataset.

The models of this paper developed to analyze panel data with two outcome variables, migration and employment, include the fixed-effects model and random-effects model. For each outcome variable, the Hausman test was employed to choose the appropriate model to be used.

The remainder of this paper is structured as follows. Section 2 presents materials and methods. Section 3 presents empirical results of the study, Section 4 discusses the key empirical results, and Section 5 concludes the paper with key policy implications.

2. Materials and Methods

2.1. Study Area and Data Source

The study was carried out in five administrative provinces of Rwanda, including the capital city, Kigali. From each province, one district was purposively selected, i.e., Rwamagana district from the Eastern province, Rubavu district from the Western province, Musanze district from the Northern province, Muhanga district from the Southern province, and Nyarugenge district from the capital city, Kigali. Some of the criteria considered to select these five districts included a high proportion of youth migrants and availability of youth economic activities.

This paper employs both quantitative and qualitative data. Quantitative data were sourced from the Integrated Household Living Conditions Surveys (EICVs) conducted by the National Institute of Statistics of Rwanda (NISR) during 2010/11 (EICV3) and 2013/14 (EICV4). Each round of surveys lasted for 12 months, and the surveys were designed to monitor sample households' poverty and living conditions countrywide. From the survey questionnaire (e.g. Supplementary Material), data collected related to socio-demographics characteristics, land characteristics, migration patterns and employment status of youth from panel households were collected and used for panel analysis. From the surveys, access to land, through inheritance, among youth was considered as one of the key factors likely to influence youth's migration and employment decisions. The EICV4 cross-sectional survey, which included a panel survey methodology for the first time, considered the same sample as the EICV3 survey [5] to purposively perform panel analysis.

A panel survey was carried out to better understand substantial progress made by Rwanda's government in reducing poverty and improving the socio-economic and demographic characteristics of sampled households. Among the 14,419 households surveyed in 2013/14, about 8160 households were purposely surveyed for the second round of the survey [5]. More specifically, the panel households headed by youth and adults were obtained after merging the raw datasets of 2010/11 and 2013/14 surveys, using household unique identifiers. To complement panel household data, the qualitative data were collected using key informant interviews (KIIs) and focus group discussion (FGDs) methods and, more specifically, key informant interviews were conducted with the director of agriculture and natural resources, director of business development and employment,

youth representatives/ entrepreneurs at the district level, and key personnel from the Ministry of Agriculture and Animal Resources (MINAGRI), Ministry of Labor and Public Services (MIFOTRA), Ministry of Youth and Culture (MYCULTURE), Rwanda Development Board (RDB), United Nations Development Programme (UNDP), and Rwanda Youth in Agribusiness Forum (RYAF). At the community level, two (2) FGDs from each district were conducted with members of youth cooperatives that employ a substantial number of youth in the selected districts.

2.2. Model Specification

This paper aims to assess the effect of land inheritance on migration and employment decisions of youth aged between 16 to 30 years [32]. The nature of data allows the use of the panel model, which is specified in Equation (1) as follows:

$$y_{iht} = \beta_0 + \beta_1 x_{1,\,it} + \beta_2 x_{2,\,it} + \ldots + \beta_k x_{k,\,it} + \varepsilon_{it}\; i = 1 \ldots .n;\; t = 1 \ldots .. T \tag{1}$$

where:

y_{iht} denotes the outcome indicator for migration and employment for individual youth i in household h during the period t between 2010/11 and 2013/14.

$x_{1,\,} \ldots, x_k$: Independent variables (land inheritance and control variables).

ε_i is a vector of the error term.

β_0 is the intercept.

$\beta_{1,\,} \ldots, \beta_k$: Coefficients for the independent variables.

The analysis of panel data requires the use of the Hausman test to select the model, either fixed- or random-effects model that is appropriate for this analysis. Firstly, the fixed-effects model is used to obtain consistent estimates and introduce the individual-effects model: $y_{it} = \alpha_i + \beta x_{it} + \varepsilon_{it}$.

The fixed-effects model deals with unobserved heterogeneity and gives consistent results for the estimates. An individual-specific component (α_i) is used instead of using the constant term (β_0) to determine a unique intercept for each individual. The fixed-effects model can be specified in Equation (2) as follows:

$$y_{iht} = \alpha_i + \beta_1 x_{1,\,it} + \beta_2 x_{2,\,it} + \ldots + \beta_k x_{k,\,it} + \varepsilon_{it} \tag{2}$$

α_i: A vector for individual fixed effects and ε_i is a vector of the error term.

Secondly, the random-effects model is used to obtain more efficient estimates and provide the best linear unbiased estimates (BLUE). When using the random-effects model, the variation across individuals is assumed to be random and uncorrelated with the independent variables included in the model. By using this model, an additional assumption to the individual effect component (α_i) is not treated as a parameter. It is rather considered as a random variable with mean μ and variance δ_α^2. The random effects model can be specified in Equation (3) as follows:

$$y_{iht} = \mu + \beta_1 x_{1,\,it} + \beta_2 x_{2,\,it} + \ldots + \beta_k x_{k,\,it} + (\alpha_i - \mu) + \varepsilon_{it} \tag{3}$$

where μ is the average individual effect.

The Hausman test examines the presence of endogeneity in the explanatory variables of the panel model. More importantly, it also compares an estimator that is known to be consistent (fixed-effects model) with an estimator that is efficient (random-effects model) under the assumption being tested [41]. The Hausman test is specified as follows:

$$H = \left(\beta^{RE} - \beta^{FE}\right)' \left[Var\left(\beta^{RE}\right) - Var\left(\beta^{FE}\right)\right]^{-1} \left(\beta^{RE} - \beta^{FE}\right)$$

where β^{RE} and β^{FE} are the vectors of parameter estimates for the random- and fixed-effects model, respectively. To choose which model to use, null and alternative hypotheses are defined as follows:

Hypothesis 0 (H0). *The appropriate model is the random-effects model, i.e., there is no correlation between the error term and the independent variables in the panel data.*

Hypothesis 1 (H1). *The appropriate model is the fixed-effects model, i.e., the correlation between the error term and the independent variables in the panel data is statistically significant.*

3. Results

3.1. Descriptive Analysis

In this subsection, we describe both outcome and control variables used in the model. Outcome variables considered are migration and employment, while control variables include household control variables such as poverty status, migrant household, number of dependent youth, age, sex, and education of the household head. Individual characteristics consider variables such as gender and sex of youth. Migration is measured by different patterns, but the most considered in modeling include migration, rural migration, and economic migration. Economic migration is more concerned as it is linked to land resources. This migration type is supported by economic reasons such as seasonal jobs, trade or business, and lack of access to land through inheritance. Therefore, we measure each pattern of migration as a dummy variable which takes the value 1 if youth migrated and 0 otherwise. Similarly, employment is being employed in agriculture or nonagriculture.

Agriculture: A dummy variable which takes the value 1 if youth's primary occupation is agriculture and 0 otherwise

Nonagriculture: A dummy variable which takes the value 1 if youth's primary occupation is nonagriculture and 0 otherwise.

To control for spurious effects in the panel data, migration and employment are regressed on the aforementioned individual and household explanatory variables. Both dummies and continuous variables are considered in this panel data model. To consider spillover effects or tendency for extreme outliers, and to meet the assumptions of inferential statistics needed to run an appropriate inferential regression analysis, the size of land inherited by youth is transformed to a natural logarithmic form.

Table 1 presents summary statistics of key variables to be used in the panel data model. For each survey, each variable of the panel data model is described by its number of observations and mean (proportions). Statistics ascertain that out of 8160 panel households, 10,685 and 9643 people were identified as youth aged between 16 and 30 years during 2010/11 and 2013/14 surveys, respectively. From these figures, about 12% of the 10,685 youth reported being the heads of surveyed households in 2010/11 compared with 14.5% of the 9643 in 2013/14. The rest are proportions of dependent youth described as children of the parents who are heads of panel households.

Table 1. Descriptive analysis of outcome and control variables of the panel data model.

Variable	Description	2010/11		2013/14	
		Number	Mean	Number	Mean
Outcome variables					
Migration	Dummy variable that equals to 1 if youth migrated and 0 otherwise	10,685	0.36	9643	0.37
Rural migrant	Dummy variable that equals to 1 if rural youth moved to either rural or urban area and 0 otherwise	3834	0.83	3588	0.48
Economic migrant	Dummy variable that equals to 1 if youth migrated to any destination area due to economic reasons and 0 otherwise	3834	0.15	3588	0.17
Agriculture	Dummy which takes 1 whether youth are employed in agriculture and 0 otherwise	10,685	0.39	9643	0.43
Nonagriculture	Dummy which takes 1 whether young person is employed in non-agriculture and 0 otherwise	10,685	0.28	9643	0.28

Table 1. *Cont.*

Variable	Description	2010/11		2013/14	
		Number	Mean	Number	Mean
Land access					
Land inheritance, Acres	Continuous, Size of land inherited, in Acres	4572	0.39	3994	0.44
Individual control variables					
Age of the youth	Continuous variable, age of young person, ranging between 16 and 30 years old	10,685	22.11	9643	22.37
Sex of the youth	Dummy variable that equals to 1 if youth is male and 0 if youth is female	10,685	0.47	9643	0.48
Is the youth hh head?	Dummy variable that equals to 1 if youth is a household head and 0 otherwise	10,685	0.12	9643	0.14
Household control variables					
Age of the hh head	Continuous variable, age of the household head, in years	8160	46.67	8160	46.11
Sex of the household head	Dummy variable that equals to 1 if the household head is male and 0 if she is female	8160	0.74	8160	0.74
Education of the household head	Dummy variable that equals to 1 if the household head is educated and 0 otherwise,	8160	0.72	8160	0.73
Perceived poverty status	Dummy variable that equals to 1 if the household is in category 3 and 4 (nonpoor) and 0 in category 1 and 2 (poor)	8160	0.58	8160	0.62
Household size	Continuous variable, number of household members	8160	4.96	8160	4.57
Household had a young migrant	Dummy variable that equals to 1 if the household had a young migrant and 0 otherwise	8160	0.32	8160	0.34

Source: Authors' analysis using primary data drawn from the National Institute of Statistics of Rwanda (NISR) Integrated Household Living Condition Surveys (EICVs): EICV-3 and EICV-4 (conducted in 2010/2011 and 2013/2014, respectively) main datasets, [42,43].

Summary statistics show significant changes between the two periods of surveys in terms of the proportion of youth who migrated from their homes to other destinations. There are noticeable changes in proportions of youth who are employed in agriculture and nonagriculture sectors, means of land size inherited by youth, and in the proportion of poor households and proportion of households with young migrants.

3.2. Mean Comparison of Migrant and Nonmigrant Households

The mean differences of the household control variables were analyzed using a *t*-test. This test was used to determine whether there was a significant difference between means of continuous variables in migrant and nonmigrant households during the two surveys. Migrant and nonmigrant households are defined as households with at least one young person who migrated or without young migrants during the periods of the two surveys. Results in Table 2 indicate that household size is positively and statistically significant at a 1% level of significance, while the size of inherited land is negatively and statistically significant at 5% and 10%.

Table 2. Test of mean difference in migrant and nonmigrant households.

Household Control Variables	*2010/11*					*2013/14*				
	Observation (n)	**Non-Migrants**	**Migrants**	**Mean Diff.**	***t*-Test**	**Observation (n)**	**Nonmigrants**	**Migrants**	**Mean Diff.**	***t*-Test**
Land inheritance, in acres	NM = 3367 M = 1205	0.382	0.437	−0.054	−2.08 **	NM = 2804 M = 1190	0.437	0.433	0.004	0.113
Household size	NM = 2668 M = 1597	5.20	5.08	0.12	1.74 **	NM = 2428 M = 1651	5.01	4.54	0.47	7.11 ***
Number of youth in the household	NM = 2668 M = 1597	1.94	1.96	−0.02	−0.58	NM = 2428 M = 1651	1.876	1.870	0.006	0.22

Source: Authors' analysis using primary data drawn from EICV 3 and EICV 4 main datasets [42,43]; *** and **, denote the significance level at 1%, 5%, and 10% of the difference between mean values for migrant and nonmigrant households during the period of 2010/11 and 2013/14; NM and M stand for nonmigrant and migrant, respectively.

3.3. Land Acquisition/Transfers in Rwanda during the Two Surveys (2010/11 and 2013/14)

Table 3 presents the proportions of youth reported to acquire land through different sources (inheritance, purchasing, gift, loan, etc.) during the two periods of surveys. Statistics show that a large share of youth who are still children in the household sourced land through inheritance, followed by those who acquired land through purchasing. While for youth who are married, the majority received land via inheritance, purchase, and free use or loan. Furthermore, results show that there is a slight increase in youth proportion who reported inheriting land between two surveys (from 42% to 43%). Moreover, the proportion of youth reported to use land granted by the government for free or loan has also slightly increased as a result of the ongoing subsidy program adopted by the Ministry of Agriculture and Animal Resources [31]. This increase is related to the current progressive engagement of youth in agriculture.

Table 3. Distribution of youth (dependent and independent) by sources of land acquisition/transfers.

Category of Youth	Means of Land Acquisition	2010/11			2013/14		
		Urban	**Rural**	**Rwanda**	**Urban**	**Rural**	**Rwanda**
Dependent youth (those who are children in the household)	Observation (n)	453	5639	6092	441	4742	5183
	Inheritance/ succession	37.53	42.45	42.09	38.32	43.65	43.2
	Purchased	28.92	26.1	26.31	25.85	27.27	27.15
	Gift	9.27	9.68	9.65	7.94	8.14	8.12
	Free use or loan	12.36	7.48	7.85	14.06	7.63	8.18
	Appropriation	0.66	0.62	0.62	0.23	0.17	0.17
	Share cropped	3.75	6.56	6.35	6.12	7.7	7.56
	leased	6.62	6.69	6.68	6.12	4.83	4.94
	Other	0.88	0.41	0.44	1.36	0.61	0.68
Independent youth (youth already married)	Observation (n)	74	1178	1252	86	1312	1398
	Inheritance/ succession	50.00	45.93	46.17	26.74	40.09	39.27
	Purchased	12.16	19.1	18.69	18.6	16.46	16.6
	Gift	6.76	3.99	4.15	2.33	3.51	3.43
	Free use or loan	20.27	13.58	13.98	18.6	17.23	17.31
	Appropriation	0	0.17	0.16	0	0	0
	Share cropped	2.7	8.15	7.83	23.26	12.96	13.59
	leased	8.11	8.74	8.71	10.47	8.99	9.08
	Other	0	0.34	0.32	0	0.76	0.72

Source: Authors' analysis using primary data drawn from EICV 3 and EICV 4 main datasets, [42,43].

3.4. Empirical Analysis

This section presents empirical results of the effects of land inheritance on youth economic migration and employment decisions. The process of analyzing the effects of land inheritance on youth migration and employment decisions has taken into account control variables used to increase the precision of estimated effects and control biases due to possible unpredicted household heterogeneity. Some of these variables include gender

and age of youth, household size, number of dependent youth, age of the household head, sex of the household head, and education of the household head.

3.4.1. Analysis of the Effect of Land Inheritance on Youth Migration Decisions

We analyzed the effect of land inheritance using two empirical models related to migration and employment, the two outcome variables. In most cases, data with cross-sectional and time-series nature were analyzed using either fixed- or random-effects models.

To estimate the effect of land inheritance on youth migration and employment decisions, the Hausman test was applied to decide which model to use between fixed- and random-effects models. In Table 4, results from the Hausman test indicate that the fixed-effects model is the appropriate model to be used instead of the random-effects model, as the *p*-value is less than 5% (Prob > chi^2 = 0.0001).

Table 4. Estimates of the Hausman test in migration model.

Variables	Coefficients			
	(b) Fixed	(B) Random	(b − B) Difference	Sqrt(Diag(V_b − V_B)) S.E
Log of land inheritance	−0.360	−0.063	−0.298	0.095
Gender of youth	0.019	0.049	−0.0301	0.067
Age of youth	0.035	0.024	0.011	0.015
Household size	0.032	−0.005	0.037	0.024
Dependent youth	−0.258	−0.014	−0.243	0.084
Migrant household	−0.106	0.158	−0.264	0.174
Age of the household head	−0.008	−0.004	−0.004	0.003
Sex of the household head	0.132	−0.101	0.233	0.161
Education of the household head	0.684	−0.073	−0.612	0.239
$chi^2(9)$ = (b − B)′[(V_b − V_B)ˆ(−1)](b − B)	40.06			
Prob > chi^2	0.0001			

b = consistent under Ho and Ha; obtained from regression model of the panel data; B = inconsistent under Ha, efficient under Ho; obtained from regression model of the panel data.

Using the general results in Table 5, estimates of the fixed-effects model show that land inheritance is negatively and statistically significant at a 5% threshold of significance (typically *p*-value < 0.05) with and without control variables. This implies that a 10% increase in land size inherited by youth is likely to decrease the probability of youth migration by 2.63%. For the robust results obtained by using robust standard errors, the estimated coefficient of land inheritance is negatively and statistically significant on youth migration. This means that a 10% increase in land size inherited by youth is likely to decrease the probability of youth migration by 3.6%. Furthermore, the results of the fixed-effects model show that control variables such as gender of youth, age of youth, household size, and sex of the household head have positive and statistically significant effects on youth migration. Other control variables such as dependent youth, age, and education of the household head have negative and statistically significant effects on youth migration.

A significant and positive effect of age of youth on migration implies that a 10% increase in age is likely to increase the probability of youth migration by 3.5% (using robust indicators). In most cases, aged youth are eager to seek job opportunities necessary to change their livelihoods, and they are more likely to migrate than youth at younger ages. Results also show that household size is positively and statistically related to youth migration. This implies youth from households with a large number of members are more likely to migrate than youth from households with a small number of people. Furthermore, there is a negative and statistically significant effect of youth dependency on migration. This signifies that households with youth who still depend (children) on their parents are less likely to migrate.

Table 5. Analysis of the effects of land inheritance on youth migration decisions using fixed-effects model.

Variable	General Results		Robust Results	
	Without Controls	**With Controls**	**Without Controls**	**With Controls**
Log of land inheritance (Coeff.)	−0.263 **	−0.360 **	−0.263 *	−0.360 ***
Standard error	0.120	0.102	0.149	0.066
p-values	0.050	0.024	0.079	0.000
R-Squared	0.284	0.938	0.284	0.938
Household and individual characteristics				
Gender of youth		0.035 *		0.019
Age of youth		0.019		0.035 ***
Household size		0.031		0.031 ***
Dependent youth		−0.257 **		−0.257 ***
Age of the household head		0.008 *		−0.008 ***
Sex of the household head		0.132		0.132 *
Education of the household head		−0.684 **		−0.684 ***
Constant	−0.053	0.323	−0.053	0.323
Prob > F	0.0496	0.0415	0.0794	0.0000

Source: Authors' analysis using primary data drawn from EICV 3 and EICV 4 main datasets, [42,43]; ***, **, and * denote level of significance at 1%, 5%, and 10%, respectively.

Estimates of the fixed-effects model confirm that the model provides a better fit to the panel data used for this analysis, as the F test (Prob > F) is statistically significant at 1% with and without robust estimates. Results also indicate that general and robust results have similar coefficients, R-squares, and constants but different probability values.

3.4.2. Analysis of the Effect of Land Inheritance on Youth Employment Decisions

Similar to the above results, we also used the Hausman test to decide whether the fixed-effects model or random-effects model is the appropriate model to estimate the effect of land inheritance on youth employment decisions. Results in Table 6 reveal that the random-effects model is the appropriate model to be used in estimating this effect, as the chi-square test statistic is 2.24 and its *p*-value is greater than 5% (Prob > chi^2 = 0.9871).

The estimated effect of land inheritance on youth employment is presented in Table 7. As per results of the Hausman test, we analyzed data using random-effects models to better understand the extent to which land inheritance is likely to influence employment decisions among young men and women. The random-effects model results are both general and robust, revealing that the estimated coefficients of land inheritance have a negative and statistically significant effect on the involvement of youth in nonagriculture activities. This suggests that an increase in land size under youth ownership reduces the likelihood of youth being employed in nonagriculture activities. In addition, the robust estimates of the random-effects model illustrate that the model better fit the data of the panel model, as the chi-square test is statistically significant at 10% (Prob > chi^2 = 0.0812). Results of the model also reveal other control variables, such as gender of youth and dependent youth (youth as a child in a household), have positive and statistically significant effects on nonagricultural employment. Age of youth has a negative and statistically significant effect on youth employment in nonagricultural activities. This implies that an increase in age reduces the likelihood of youth being employed in nonagriculture.

Serial correlation is tested to check whether error terms of fixed- and random-effects models from different periods are correlated or not. Table 8 illustrates the correlation of $\hat{\mu}$ (μ-hat, labeled as residuals) with L1. μ-hat and log of land inheritance, considered as the basic independent variable of the models, across the two time periods (2011 and 2014).

Table 6. Estimates of the Hausman test in the employment model.

Variables	Coefficients			
	(b)	(B)	(b-B)	Sqrt(Diag(V_b-V_B))
	Fixed	Random	Difference	S.E
Log of land inheritance	0.048	−0.046	0.093	0.197
Poverty	−0.076	0.033	−0.109	0.345
Gender of youth	0.523	0.105	0.417	0.400
Age of youth	−0.059	−0.014	−0.045	0.093
Economic migrant	0.755	−0.009	0.763	1.366
Dependent youth	0.333	0.060	0.273	0.266
Migrant household	0.699	0.098	0.601	1.003
Age of the household head	0.014	0.000	0.014	0.019
Sex of the household head	0.128	0.004	0.124	0.551
$chi^2(9) = (b - B)'[(V\_b - V\_B)^(-1)](b - B)$	2.24			
Prob > chi^2	0.9871			

b = consistent under Ho and Ha; obtained from regression model of the panel data; B = inconsistent under Ha, efficient under Ho; obtained from regression model of the panel data.

Table 7. Analysis of the effects of land inheritance on youth employment decisions (nonagriculture) using random-effects model.

Variables	General Results		Robust Results	
	Without Controls	With Control	Without Controls	With Control
Log of land inheritance (Coeff.)	−0.041 *	−0.046 *	−0.041 *	−0.046 *
p-values	0.080	0.055	0.091	0.072
R-Squared	0.004	0.146	0.004	0.146
Household and individual characteristics				
Gender of youth		0.105 *		0.105 *
Age of youth		−0.014		−0.013 *
Dependent youth		0.060 **		0.060 **
Constant	0.240	0.182	0.240	0.182
Prob > chi^2	0.2139	0.1476	0.2402	0.0812

Source: Authors' analysis using primary data drawn from EICV 3 and EICV 4 main datasets, [42,43]; **, and * denote level of significance at 5%, and 10%, respectively.

Table 8. Test for serial correlation (1).

μ-hat	Coefficient	Std. Err.	t	*p* > t
L1. *μ*-hat	−0.329	0.200	−1.65	0.114
Log of land inheritance	−0.070 *	0.035	−1.98	0.06
Constant	−0.181	0.093	−1.95	0.064
Number of observations	=	26		
F (2,23)	=	2.68		
Prob > F	=	0.0901		
R-squared	=	0.1889		
Adj R-squared	=	0.1183		
Root MSE	=	0.28794		

* denote level of significance at 10%.

To test whether the model has a serial correction or not, the Breusch–Godfrey Lagrange Multiplier test was used. As the probability value for this model is very high

(p-value = 0.4933)(see Table 9), we failed to reject the null hypothesis stating that there is no serial correlation. We conclude that the model does not have first-order autocorrelation.

Table 9. Test for serial correlation (2).

lags(p)	chi^2	df	Prob > chi^2
1	0.469	1	0.4933
H0: no serial correlation			

Since the size of land inherited by youth has a negative and statistically significant effect on youth migration and nonagriculture employment, empirical results of this study suggest policy measures that create increased access to land to discourage youth migration out of agriculture.

4. Discussion

Land is one of the main natural resources that improve people's livelihoods by moving them out of poverty, if it is well managed and effectively used. The literature confirms that youth in many rural communities in Africa have access to family land through inheritance [7]. Youth can also have access to land through purchase, rentals or government. However, financial constraints limit the youth from engaging in such arrangements, and a good number of youth become landless [16].

Results of this study show that land inheritance has a negative and statistically significant effect on youth migration and nonagricultural employment. While assessing the estimated effect of land inheritance on youth migration, we found that land inheritance has a negative and statistically significant effect on youth migration, which suggests that the larger the size of land inherited by the youth the lower the probability of their movement to an urban area. As land contributes to the improvement of owners' livelihoods, rural youth with access to land are likely to stay in rural area because of financial opportunities they expect from land resources.

These include renting out the land, using land as collateral when he/she requests a bank loan, and cultivation for home consumption and market as well. With limited land for rural youth, there is a possibility of escaping rural areas and migrating to a destination with diverse job opportunities. This is consistent with an increase in national estimates/proportions of young people who migrated internally and outside the country from 16% to 22.2% of the total youth population between 2012 and 2017 due to economic reasons including land shortage [5,27]. Similarly, findings from [7] indicate that larger sizes of land that rural youth expect to inherit significantly declines the probability of youth migration to urban areas. In addition, [29] foud a significant negative effect of the size of land inherited by youth on youth migration.

Results of this study reveal that there is a negative and statistically significant effect of land inheritance on youth employment. This means that the larger the size of land inherited by youth the lesser the probability of youth being employed in nonagriculture activities. In other words, youth who inherit small sizes of land are more likely to engage in nonagriculture activities for the available land-related advantages. During focus group discussion, members of youth cooperatives highlighted that the majority of youth decide to engage in nonagriculture activities because of limited land owned by their families. The study findings are well reiterated in [16,29], stating that lack of access to land or decline in the per capita farm size is related to a decline in the likelihood of youth in choosing agriculture activities. Findings of other studies confirmed that lack of land inheritance is considered as one of the main reasons for less participation of youth in agriculture activities [19,20], and those who committed to engage in nonagriculture businesses are mainly constrained by lack of financial ability required to invest in nonagricultural businesses [17].

Furthermore, results derived from [36] confirm that youth from poor households, with or without small amounts of land, are less likely to engage in agriculture when compared

with youth from households with large sizes of land reserved for agriculture. However, the government of Rwanda, through MINAGRI, has embarked on increasing the proportion of youth engaged in agriculture activities by supporting youth cooperatives involved in agriculture. The government plays a role in availing and providing rehabilitated land to youth grouped into cooperatives, while these cooperatives are responsible for land use and management. With this approach, the sole requirement for using this land is to cultivate commercial crops [44]. The government of Rwanda, through its business development fund (BDF), assists youth's small and medium enterprises (SMEs) without sufficient collateral to have access to bank credit at reasonable rates. More importantly, BDF is involved in creating employment for youth, refinancing grants for youth, and covering 50% to 75% of the collateral required by lending institutions [45].

5. Conclusions and Key Policy Implications

A growing rural population is continuously reducing the per capita land availability for farming activities by rural households. Youth have access to land through different means such as inheritance, purchasing, gift, government (free use or loan), appropriation, share cropped, and leases. With this study, much emphasis was given to land acquired through inheritance. A noticeable increase in youth migration, from rural to either urban or rural areas, is mainly associated with economic pushing factors including mainly lack of ownership/ inheritance over land and inadequacy of job opportunities in their places of origin, among other factors.

The study attempts to assess whether land inheritance has a significant effect on youth migration and employment decisions. The empirical analysis performed is based on household panel data sourced from the Integrated Household Living Conditions Surveys (EICVs) during the periods of 2010/11 and 2013/14. Fixed- and random-effects models were employed to respond to the set objectives. Findings of the study reveal that the size of land inheritance has a negative and significant effect on youth migration, which suggests that the larger the size of land inherited by the youth the lower the probability of youth migration. Concerning employment, results confirm that land inheritance among youth has a negative and statistically significant effect on youth's nonagricultural employment. This means that the larger the size of land inherited by youth the lesser the probability of youth being employed in the nonagricultural sector.

In response to the above findings and issues related to limited access to land among the youth, the following key policy implications are expected:

1. As the creation of access through inheritance to land slows down the propensity of youth migration and working in the nonagricultural sector, there is a need for continuously supplying rehabilitated land for rural youth grouped into cooperatives for better use and management;
2. The government should finance new and existing infrastructure in the agricultural sector and provide land for youth to encourage them to fully engage in agricultural sector.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/su14095404/s1, This Supplementary Material presents sample questions used to collect information related to the variable of interest such as socio-demographics characteristics, land characteristics, migration patterns, and employment status of members of panel households. The questionnaire is attached as an icon.

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