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Migration in Kenya: Beyond Harris-Todaro

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Abstract

This paper examines the impact of agrarian structures on the migration behavior and destination of rural household heads and individuals in Kenya. To explore the complexity of migration we extend the standard Harris-Todaro framework to account for land inequality and size as well as type of destination. Using logistic regressions, we show that Kenyan household heads born in districts with higher land inequality, smaller per capita land and lower per capita rural income are more likely to migrate. We show that for individuals whose incomes are squeezed by larger land inequality, migration from villages to suburban Nairobi, smaller cities, and villages in different districts could be a preferable strategy to migrating to Metro Nairobi. The impact of land inequality is more significant for male than female migration. Moreover, the level of education, age, marital status, gender, religion and distance to Nairobi play a role in migration behavior.

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1. Introduction

It's widely accepted that the expected urban and rural incomes are important factors in determining rural-to-urban migration. Harris and Todaro (1970) and many others (e.g. Cole and Sanders, 1985; Fields, 1975, 2005) have theoretically shown that migration of rural dwellers to urban towns or cities is due to better employment opportunities and/or higher wages. Empirical case studies based on micro data also find that expected urban and rural incomes are crucial determinants of rural-to-urban migration (Zu, 2002; Tunalı, 1996; Bowles, 1970; Fields, 1982; Schultz, 1982). Similar results are shown in empirical studies focusing on migration in Kenya (Agesa, 2000; 2001; Agesa and Agesa, 1999; Bigsten, 1996; Gray, 2011).

Unlike the previous empirical work, this is the first study that examines land distribution's impact on the migration behavior and destination together with the influence of per capita land in a rural area. Higher land inequality in a region suppresses agricultural income of rural median households and pushes them to other areas (Harris, 1978; De Janvry, 1981; Galeano, 2009; Oyvat; 2016). Using the Kenya Integrated Household Budget Survey conducted for 2005/06 (KIHBS 05/06) and the Rural Labor Force Survey of 1988 (RLFS 88), we find that the rural dwellers who were born in areas with higher land inequality, lower per capita land and lower per capita rural income are more likely to migrate. In effect transmitting, the poverty and inequality in a village to other areas via the migration process (Oyvat, 2016).

The dominance of the Harris-Todaro model has led to the neglect of the examination of other destinations of migration. With a few exceptions (McCormick and Wahba, 2005), the empirical works on migration within the developing countries focus on rural-to-urban migration and tend to ignore rural-to-rural migration. Further, the urban destination is often treated as being homogenous apart from wage differentials. In reality, we know that capital cities or large urban centers are very different in terms of opportunities and costs of settlements, and amenities than smaller urban centers. In this study, we show that higher land inequality in rural household heads' home districts increase their probability of migrating to other villages, smaller cities or towns, four largest urban areas- specifically Mombasa, Kisumu, Nakuru, Eldoret (Uasin Gishu)[1] and suburban Nairobi but not metro Nairobi[2]. However, due to higher living costs (Mudege and Zulu, 2011; Béguy, Bocquier and Zulu, 2010), uneven distribution of infrastructure and the insecure environment in Nairobi (Archambult, De Laat and Zulu, 2012); a framework based on distribution and expected incomes is weak in explaining the migration from rural villages to Metro Nairobi.

[1] We will use the whole urban Uasin Gishu as a proxy for Kenya's fifth largest city Eldoret, since core and periphery of urban Eldoret constitute 91.4% of the whole urban Uasin Gishu (KNBS, 2012) and our data from Kenya Integrated Household Budget Survey (05/06) does not distinguish Eldoret from the rest of urban Uasin Gishu.

[2] Over recent years, people working in Nairobi have often had to live outside its administrative boundaries. We therefore have used three definitions of Nairobi in our paper. Metro Nairobi is defined as Nairobi district. Suburban Nairobi is Thika and Kiambu, which are less than one-hour distance to Metro Nairobi. This is because, Thika and Kiambu increasingly become bedroom communities for Nairobi. Greater Nairobi is both Metro Nairobi and Suburban Nairobi.

Compared to rural-to-rural and rural-to-smaller urban center migration, the years of education have significantly larger influence on migration from villages to Nairobi. The rural dweller's age only reduces the probability of rural-to-urban migration; it does not significantly decrease the probability of rural-to-rural migration. We also find that distance to Nairobi significantly affects migration destination with the exception of migration to Metro Nairobi.

The paper proceeds as follows: The next section explains migration trends in Kenya and then discusses the factors that would influence rural dwellers' migration towards different areas. The third section contains the empirical analysis testing the theories on migration, and the last section concludes.

2. Characteristics of migration in Kenya

2.1 The Kenyan economy and structures of migration

Understanding the nature of migration in Kenya requires an understanding of the structure of the contemporary Kenyan economy. The genesis of the contemporary economy is found in the colonial period beginning in the late 19th century. Prior to colonialism, the economy in this region of East Africa was dominated by subsistence farming, pastoral production, and long distance trade. While local markets existed it is safe to assume that in most instances markets were used to trade surplus goods from self-provisioning production with the exception of a few key goods in the long-distance trade, such as ivory which was produced specifically for the market. This type of economy tended to produce few high-density agglomerations apart from the port cities through which the long distance trade was connected to the rest of the world (Ehret 1984, Matveiev 1984, Ogot 1984, Kitching, 2011).

Colonialism reorganized the economy in a number of crucial ways. First, by minimizing access to land for Africans it created a laboring class that needed wage employment to survive. Second, through the creation of areas of capitalist farms and their attendant agro-processing industries and services, it increased the degree of urbanization throughout the economy (Kitching, 2011). Despite these profound changes colonialism and the post-independence 'modern' economy has not completely eradicated the self-provisioning sector. The result is that the Kenyan economy is characterized by enclaves consisting of capital-intensive capitalist farming, small manufacturing and agro-processing sector and a relatively large administrative and service sector in a sea of smallholder farming (wa Gĩthinjĩ 2010).

This smallholder sector tends to be the primary source and reserve of labor for the economy. During the colonial period, a strict control of migration to the other sectors was put in place through the internal passport or *kipande* system. This policy was put in place both as a control of wages as well as to ensure that there was sufficient labor for the new capitalist enterprises (Anderson 2000). This control resulted in a heavily male skewed migrant population and established the tradition of male migration with families being left in the rural

areas under the wife. This accounts for the high number of female-headed rural households in Kenya, which are about 30 per cent of the rural population (wa Gĩthĩnji, Charalampos, and Barenberg, 2014). The process of migration from the rural smallholder sector to the centers of economic activity in the so-called "white highlands" where the capitalist farms were situated and the new colonial urban centers which housed rudimentary manufacturing and agro-processing industries, as well as a large retail and service sector, continued in the post-independence period. It is in the context of the relatively large movements from the rural smallholder sector to the urban centers after the lifting of migration control in post-independence Kenya that the Harris-Todaro model that became the standard theoretical foundation of migration in developing countries was developed[3].

2.2 Contemporary patterns of migration.

Similar to the majority of the developing countries (UNDP, 2009), Kenya has seen increased levels of migration and urbanization from the 1960's[4]. Although there was a small deceleration during the 1980s in the rate of urbanization (Figure 1), the share of the urban population in Kenya increased in each period. Between 1960 and 2014, the share of population living in Kenyan urban areas rose from 7.4% to 25.2%. As is evident from the figures despite the rapid rate of growth of urban centers, Kenya is still a rural country. Its level of urbanization is lower on average than the level of urbanization in Sub-Saharan Africa and/or lower income countries.

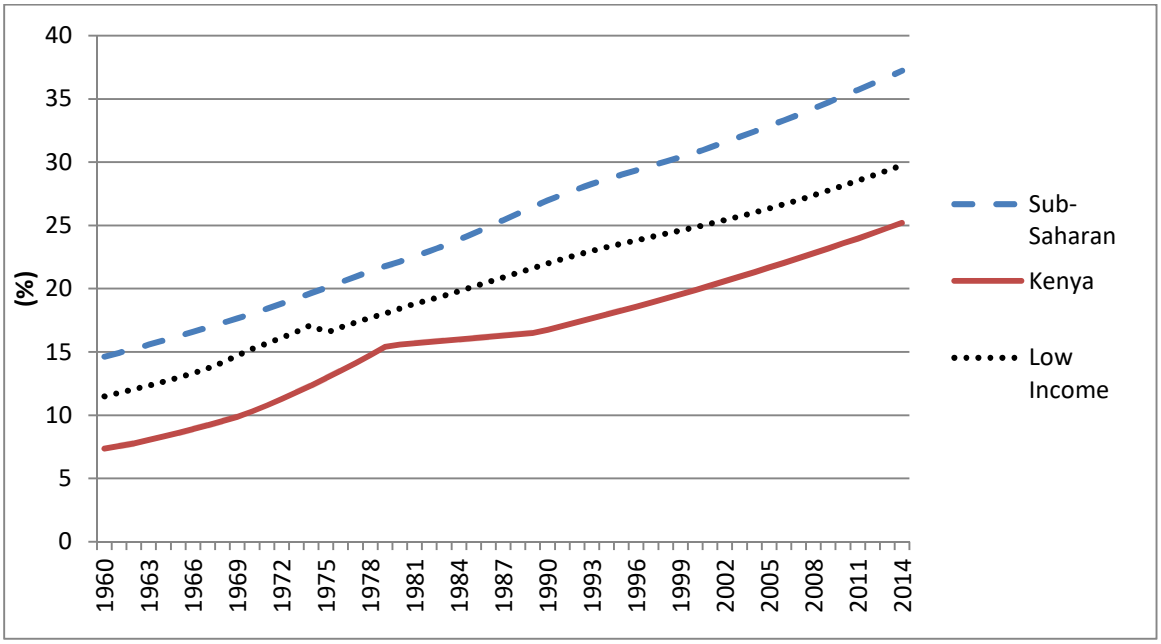
Unlike many other Sub-Saharan countries, Kenya did not experience a serious wave of first-city bias and agglomeration. The level of agglomeration- share of population living in the cities of more than 1 million population- was only 10.8% by 2014. This includes the share of population living in Kenya's two main cities- Nairobi and Mombasa[5]. As shown in Figure 2,

[3] According to a number of studies, the migration behavior is more complex than the Harris and Todaro (1970) model. In the Harris and Todaro model, the expected urban and rural incomes converge to an equilibrium point as an outcome of rural-to-urban migration. On the other hand, Faini (1996) shows that rural-to-urban migration increases the gap between urban and rural incomes, when the factors of production have increasing returns to scale. In addition, Poot (2008) exhibits that migration leads to aging population in smaller areas, which could increase the regional gaps of productivity. In contrast, Stark, Helmenstein, and Prskawetz (1997) show that migration could raise the average income in the relatively backward regions through the human capital gains of return migration. Last, the New Economics of Labor Migration literature (e.g. Stark and Bloom, 1985; Stark and Taylor, 1991) explains the migration behavior with relative deprivation rather than absolute incomes, which will also be discussed in this paper. However, the empirical evidence on Kenya (e.g., Agesa, 2000, 2001; Agesa and Agesa, 1999; Bigsten, 1996; Gray, 2011) and on other developing economies (e.g. Schultz, 1982; Tunalı, 1996 and Zhu, 2002) strongly supports Harris and Todaro's main claim that expected urban and rural incomes' affect rural-to-urban migration. For this reason and also for the simplicity reasons, our model is mainly based on Harris and Todaro (1970). However, we will also consider the direct impact of relative deprivation in our discussion.

[4] In our study as in most studies using cross sectional data we are only able to analyze the most recent migration. We can make no claims as to whether this is a temporary, circular or permanent migration. The respondents in the survey used however have been surveyed at what they presently consider their permanent address.

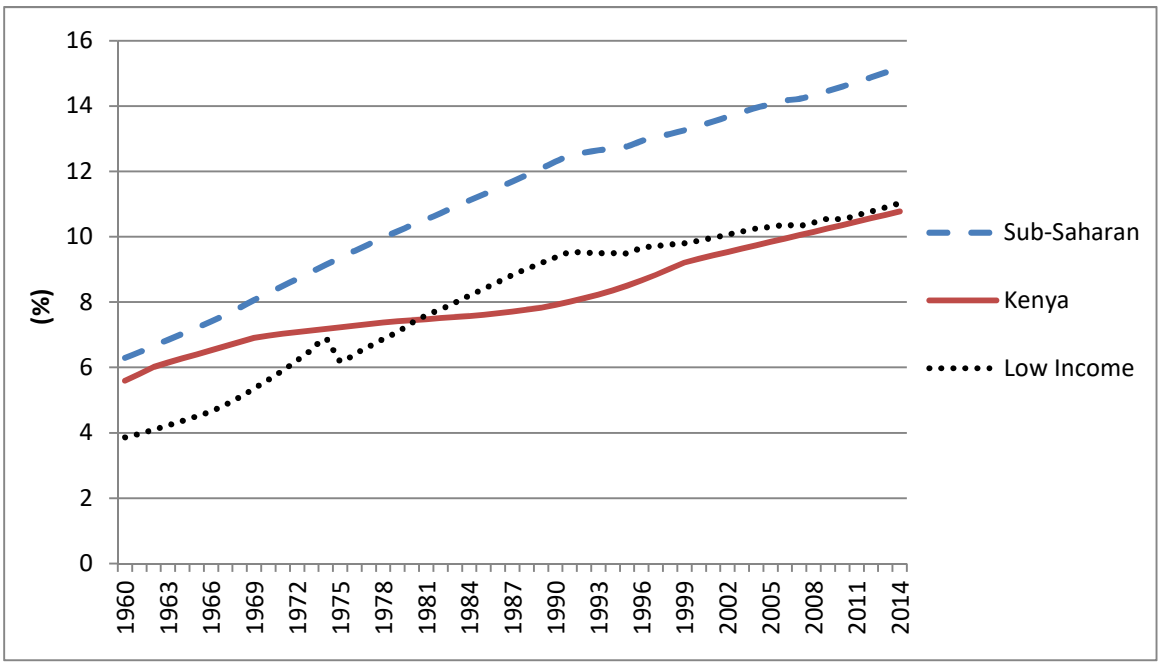
[5] Our share of agglomeration is from World Bank (2016)'s World Development Indicators(WDI) database. WDI does not explicitly report the cities that were included in their agglomeration classification. Nevertheless, both WDI's share of agglomeration for 2009 and Nairobi and Mombasa total population share in Kenya estimated from KNBS (2012)'s 2009 Kenya Population and Housing Census are consistently 10.5%. Moreover, WDI's share of agglomeration data is smooth and continuous, which shows that the estimates in WDI consider the same cities. Following these two outcomes, we can conclude that share of agglomeration values in WDI data considers Nairobi and Mombasa.

Figure 1: Level of urbanization in Kenya and average level of urbanization in Sub-Saharan Africa and lower income countries (%, 1960 – 2014)



Source: World Bank (2016)

Figure 2: Share of agglomeration in Kenya and average share of agglomeration in Sub-Saharan and lower income countries (%, 1960 – 2014)



Source: World Bank (2016)
Note: The level of agglomeration is defined as the share of population living in the cities of more than 1 million population

the level of agglomeration grew slower in Kenya than the Sub-Saharan countries, and over the entire period was roughly the same as that of low income group of countries.

In addition to rural to urban migration, rural-to-rural migration is also a very important and understudied phenomenon in Kenya. Using KIHBS (05/06), Table 1 exhibits the share of final destination of rural-born individuals. According to Table 1, 75.25% of household heads live in the rural areas in their origin district. 11.70% of the rural-born individuals migrated to villages in the other districts. On the other hand, the share of rural-born individuals migrating to urban areas is 13.05%. Migration to Greater Nairobi is only 5.41%. These figures are consistent with Figure 2, and demonstrate that migration to urban areas other than Nairobi is a bigger phenomenon in Kenya than rural-to-Nairobi migration.

Table 1: Shares of migration decisions of adults(18+) who were born in the rural areas

	(%)
Rural to Greater Nairobi	5.41
Rural to MKNE	3.15
Rural to Mombasa	*1.38*
Rural to Kisumu	*0.81*
Rural to Nakuru	*0.57*
Rural to Eldoret	*0.40*
Rural to other urban	4.49
RURAL TO URBAN OVERALL	13.05
RURAL TO RURAL	11.70
NO MIGRATION	75.25

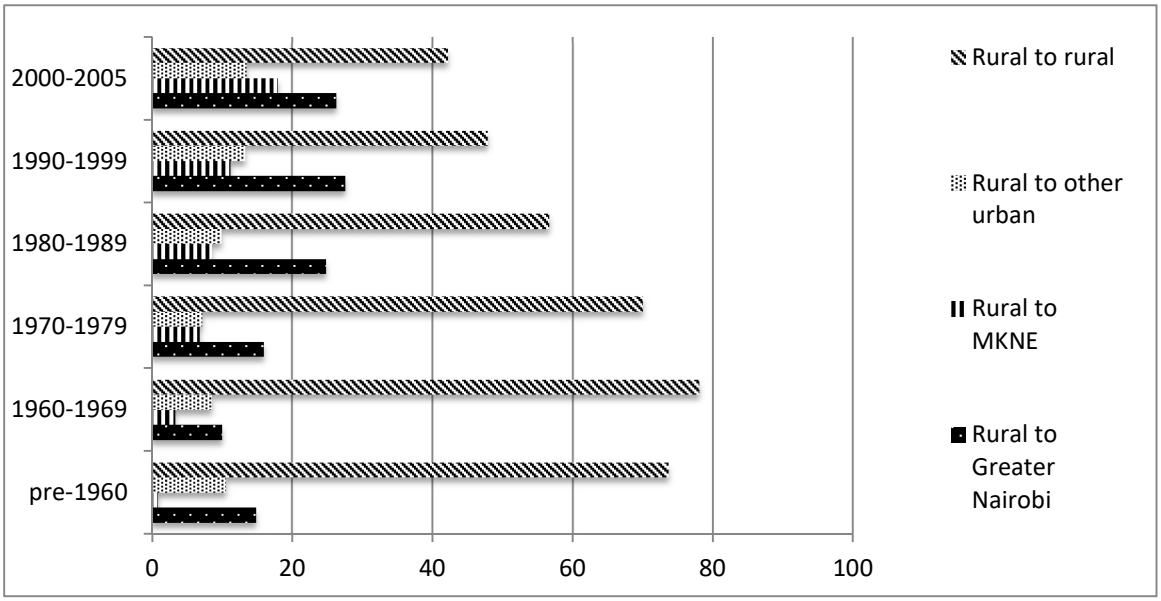
Notes: Unless otherwise noted all following tables are authors' calculations from Kenya Integrated Household Budget Survey (05/06). Greater Nairobi includes Nairobi and urban areas that is at most one-hour distance from metropolitan Nairobi (Kiambu, Thika). These areas also act as bedroom communities for Nairobi. While there are other bedroom communities in Kajiado and Machakos districts they were not individually identified in the data and also are only a small proportion of the urban population in those districts, which have other urban centers that are not bedroom communities to Nairobi. MKNE stands for the four largest urban areas after Nairobi (Mombasa, Kisumu, Nakuru, and Eldoret).

As shown above there are differences in migration destinations exemplifying the complexity of migration destination (wa Gĩthĩnji 2000). Over time there has been a distinct shift in migration patterns. The share of those going to urban areas has increased while those migrating to other rural areas decreased. Within urban areas Greater Nairobi and the other large cities have also over time become more important relative to other urban areas. We should note the jump in rural to urban migration for the post 1980 period. A fact probably attributable to the rapid expansion of schools immediately after independence in 1963 and the graduation of the first generation of rural Kenyans with access to these schools[6]. Rural-to-

[6] Urban migration has been found in the past to be dominated by secondary school educated individuals (wa Gĩthĩnji 2000). In 1960 there were only 91 secondary schools, which increased to 142 on the eve of independence in 1962, by 1968, 5 years after independence there were 601 a more than 6-fold increase from 1960 (GOK, 1969).

rural migration has remained important throughout the period and in 2000-2005 still accounted for over 40 per cent of the total migration. The share of rural born individuals migrating to the larger cities significantly increased following the 1980s (Figure 3). However, rural born individuals' migration to rural areas and smaller urban areas has been more important in Kenya even in 2000s. During the period of 2000-2005, 55.72% of rural born migrants moved to villages and to the smaller urban areas other than the five most populated urban areas; whereas, 26.32% moved to the greater Nairobi area. Last, migration in Kenya is mainly done by younger individuals. Regardless of the migration destination, the majority of migrants moved to their final location between ages 17-40 (Table 2).

Figure 3: Shares of final migration destination of adults (18+) migrants who were born in the rural areas (%) – *Migration decision by period*



Note: Authors' calculations from Kenya Integrated Household Budget Survey (05/06).

Table 2: Shares of migration ages of adult (18+) migrants who were born in the rural areas (%)

	Rural to Greater Nairobi	***Rural to MKNE***	***Rural to other urban***	**Rural to urban overall**	**Rural to rural**	**TOTAL**
0-16	11.2	11.9	16.3	12.7	19.1	16.0
17-24	60.2	50.2	38.1	52.3	45.2	48.5
25-40	26.2	30.8	36.2	29.8	27.0	28.3
41-59	2.1	6.1	7.7	4.5	6.9	5.8
60-	0.2	1.0	1.7	0.8	1.9	1.4
Total	**100**	**100**	**100**	**100**	**100**	**100**

Note: Authors' calculations from Kenya Integrated Household Budget Survey (05/06).

2.3 What influences the migration behavior?

Several factors including age, years of education, marital status, family relations, culture, access to services, disasters, conflicts etc. may influence migration decisions. Nevertheless, urbanization is mostly stimulated by changing income opportunities in both urban and rural areas. Industrialization has resulted in an increase in opportunities in urban areas relative to rural areas leading to increased urbanization. Historically, the rate of urbanization has accelerated with capitalist development. The percentage of the world population living in cities of 20,000 or more was only 2.4% in 1800. It increased to 9.2% in 1900 and to 20.9% in 1950 (Davis, 1955). Most growth of the world urban population during this period occurred in countries that were early industrializers.

In the underdeveloped world, the growth of industry was slow until the 1950s. During 1925–50 only 10% of the rural population moved to the urban areas in the developing countries for which data are available (Araghi, 1995). From 1950 to 1975, the percentage of the rural population that moved to the urban sector jumped to 25%. This change may be due in part to the emerging industrial policies[7] and the availability of cheap food reducing the costs of labor. In addition, push factors such as the spread of labor-saving technologies in agriculture (De Janvry, 1981 and Köymen, 2008), the destruction of "z-goods" production[8] (Hymer and Resnick, 1969), and an urban bias in national policies (Lipton, 1976 and Williamson, 1988) might have stimulated urbanization in developing economies.

A variety of models (Cole and Sanders, 1985; Fields, 1975, 2005) following the approach of Harris-Todaro (1970) explain the migration through differences in expected incomes. This framework is also supported by several empirical studies (Zhu, 2002; Davies, Greenwood and Li, 2001; Tunalı, 1996; Bowles, 1970; Fields, 1982; Schultz, 1982).

In the Harris-Todaro framework a rural individual's probability of moving from i to j could be written as

$$P_{ij} = f\left(\frac{g_j}{L_j} h_j - S_i\right) > 0, \qquad 0 < P_{ij} < 1 \tag{1}$$

where h_j is an employed migrant's expected income, g_j is employment j, L_j is the labor force in j and S_i is expected income in the rural area i.

In parallel to Harris-Todaro, several studies show that the expected urban-rural incomes are important factors behind the migration in Kenya. Agesa (2000, 2001) points out that in Kenya the gap between expected urban and rural wages and higher levels of education create incentives for rural-to-urban migration as the returns for higher productivity are greater in cities. Agesa and Agesa (1999) similarly show that Kenyan females have smaller incentives for migrating as the urban-rural wage gap is greater for males. Using a probit model, Agesa and Agesa (2005) examine the factors behind rural-to-urban migration in Kenya. They find

[7] Amsden (2001) and Chang (2008) provide good summaries on how import substitution and export-oriented industrial policies stimulated the growth of industry in the developing world.

[8] Z-goods is a term defined by Hymer and Resnick (1969) for non-agricultural traditional activities in an agrarian economy. These activities consist of food processing, handicraft activities and services for local needs.

that the difference between the expected wages for migrants in urban areas and non-migrants in rural areas significantly increase the likelihood of rural-to-urban migration for males; however, rural-urban earnings gap does not have a significant effect on the migration behavior of females.

Another study specifically focusing on circular migration of rural dwellers in Kenya (Bigsten, 1996) finds that high wages in cities influence rural dwellers' migration decision; whereas land ownership does not have a significant effect. On the contrary, Agesa (2001) and Gray (2011) show that greater land area reduces rural dwellers' probability of permanent migration from rural to urban in Kenya. Gray also points that soil degradation in Kenya stimulates rural-to-urban temporary migration.

The influence of expected rural incomes on migration is also shown by the Kenyan data used in this study. For household heads, 80.5% of migration to cities/town and 59.9% of migration to other villages is explained by job and income related reasons such as starting a new business, looking for new work or land (see Table 3).

The impact of job and income related on migration behavior is more obvious for male individual than females. 70.8% of rural born adult male migrants left their home districts for job and income related reasons; whereas, this ratio is only 28.8% for adult female migrants. 46.7% of rural born adult females migrated due to marriage, family disagreement or divorce and 17.2% of rural born female migrants moved to other areas to live or to move with their parents or relatives. Family reasons could still be highly related with household heads' migration decisions based on job and income related reasons. Although many of the non-household heads migrated to live with their families, earning higher incomes might be the reason behind the migration of their families.

2.4 Land inequality as a cause for migration

The simplified framework in Harris-Todaro assumes that the rural sector is formed by identical agents receiving equal wages[9]; hence, it does not consider land inequality's impact on the migration behavior. A number of studies of Latin America economies point out that the inegalitarian agrarian structure in Latin America reduces the incomes of the peasant masses and pushes the rural dwellers to other areas (mainly cities) thus contributing to the faster growth of urban population (e.g Harris, 1978; De Janvry, 1981; Galeano, 2009). The urbanization in Latin America increases with the rapid spread of labor saving technologies in the rural sector, which leave the cheap labor in plantations unemployed.

Similarly studies on Korea (Amsden, 1989, 1990) and Turkey (Keyder, 1987) claim that the relatively egalitarian land structure and predominance of family farms in these countries made staying in agriculture a better option for peasant masses and limited mass migration. In summary, for the same per capita urban and rural incomes, there will be greater urbanization in countries whose land distribution is more unequal. This congestion in cities pulls down wages, especially for unskilled urban workers.

[9] Similarly, the urban sector is also formed by underemployed agents and agents that receive identical wages.

Table 3: Migration reasons (%) by household heads, adult males and adult females

HOUSEHOLD HEADS					
	Move/live with family or relatives	**Marriage**	**Job and income related**	**Education and health related**	**Other**
Rural to Greater Nairobi	6.0	2.4	78.8	11.1	1.6
Rural to MKNE	4.3	4.5	85.7	3.3	2.2
Rural to Mombasa	*4.5*	*6.1*	*85.8*	*2.3*	*1.2*
Rural to Kisumu	*0.9*	*4.6*	*90.0*	*4.6*	*0.0*
Rural to Nakuru	*9.6*	*0.8*	*80.3*	*4.7*	*4.6*
Rural to Eldoret	*1.2*	*3.3*	*86.4*	*3.0*	*6.1*
Rural to other urban	5.4	10.9	79.0	1.3	3.6
RURAL TO URBAN OVERALL	5.5	4.9	80.5	7.0	2.2
RURAL TO RURAL	12.3	23.4	59.9	0.6	3.8
ALL ADULTS (18+) – MALE					
	Move/live with family or relatives	**Marriage**	**Job and income related**	**Education and health related**	**Other**
Rural to Greater Nairobi	9.1	0.0	76.1	13.7	1.1
Rural to MKNE	16.8	1.4	71.2	9.6	1.0
Rural to Mombasa	*13.3*	*3.0*	*75.7*	*8.1*	*0.0*
Rural to Kisumu	*15.5*	*0.0*	*69.5*	*15.0*	*0.0*
Rural to Nakuru	*19.6*	*0.0*	*70.4*	*7.9*	*2.1*
Rural to Eldoret	*26.8*	*0.0*	*60.1*	*8.9*	*4.2*
Rural to other urban	19.2	0.4	74.5	2.9	3.0
RURAL TO URBAN OVERALL	13.3	0.5	74.4	10.3	1.5
RURAL TO RURAL	27.5	0.5	66.2	1.7	4.1
ALL ADULTS (18+) – FEMALE					
	Move/live with family or relatives	**Marriage**	**Job and income related**	**Education and health related**	**Other**
Rural to Greater Nairobi	17.8	26.2	40.9	13.3	1.9
Rural to MKNE	21.5	38.0	28.3	10.0	2.2
Rural to Mombasa	*17.2*	*41.7*	*31.5*	*8.3*	*1.3*
Rural to Kisumu	*24.6*	*37.8*	*21.4*	*14.3*	*1.9*
Rural to Nakuru	*30.5*	*26.8*	*28.8*	*11.1*	*2.8*
Rural to Eldoret	*18.0*	*38.7*	*34.7*	*2.3*	*6.4*
Rural to other urban	22.3	33.6	36.7	3.1	4.4
RURAL TO URBAN OVERALL	19.9	31.0	36.8	9.7	2.7
RURAL TO RURAL	15.1	58.4	22.9	1.4	2.2

Note: Authors' calculations from Kenya Integrated Household Budget Survey (05/06). Head of household measure includes female heads of households.

Based on Harris-Todaro's (1970) theoretical framework, Oyvat (2016) theoretically shows that a larger land inequality suppresses the incomes of rural poor and pushes them to the urban areas. This creates a larger reserve army of labor in the urban areas thus transforming and transmitting rural land inequality into urban inequality. Oyvat supports his argument with an empirical analysis exhibiting that an increase in the land Gini coefficient leads to higher levels of urbanization and urban income inequality at the cross-country level.

To examine the impact of land inequality on migration, we extend the Harris-Todaro (1970) model to account for land inequality. In our model, the agrarian structure is formed by N_S of small farmers (S) and N_L of large farmers (L). The total income of small farmers (Y^{Si}) in i is determined by total land (T_{Si}), total capital (K_{Si}) and total number of small farmers (N_{Si}) as:

$$Y^{Si} = a_0(T_{Si})^{a_1}(K_{Si})^{a_2}(N_{Si})^{a_3} \tag{2}$$

where

$$0 < a_0, \quad 0 < a_1, \quad 0 < a_2, \quad 0 < a_3 \tag{3}$$

Similarly total income of large farmers (Y^{Li}) in i is a function of total land (T_{Li}), total capital (K_{Li}) and total number of larger farmers (N_{Li}).

$$Y^{Li} = b_0(T_{Li})^{b_1}(K_{Li})^{b_2}(N_{Li})^{b_3} \tag{4}$$

where

$$0 < b_0, \quad 0 < b_1, \quad 0 < b_2, \quad 0 < b_3 \tag{5}$$

Considering that ψ^{Li} and ψ^{Si} are respectively product per land in small and large farms in i, we can rewrite the total incomes of small and large farms in i as

$$Y^{Si} = T_{Si}\psi^{Si}(T_{Si}, K_{Si}, N_{Si}) \tag{6}$$

$$Y^{Li} = T_{Li}\psi^{Li}(T_{Li}, K_{Li}, N_{Li}) \tag{7}$$

We assume that the total production in small and large farms equally shared by identical farmers. Therefore, per capita income of small farmers (y^{Si}) and per capita income of large farmers (y^{Li}) in i are

$$y^{Si} = \frac{T_{Si}\psi^{Si}(T_{Si}, K_{Si}, N_{Si})}{N_{Si}} \tag{8}$$

$$y^{Li} = \frac{T_{Li}\psi^{Li}(T_{Li}, K_{Li}, N_{Li})}{N_{Li}} \tag{9}$$

Similar to Harris and Todaro (1970), the migration behavior is determined by the expected incomes in the origin and the migration destination. The probability function of moving from i to j for a small farmer in i is

$$P_S^{ij} = f^S\left(E(Y^j) - \frac{T_{Si}\psi^{Si}(T_{Si}, K_{Si}, N_{Si})}{N_{Si}}, C_{ij}\right) > 0, \quad 0 < P_S^{ij} < 1, \tag{10}$$

$$f_1^S > 0, \ f_2^S < 0 \tag{11}$$

and for a large landlord in *i* is

$$P_L^{ij} = f^L\left(E(Y^j) - \frac{(T_i - T_{Si})\psi^{Li}(T_i - T_{Si}, K_{Li}, N_{Li})}{N_{Li}}, C_{ij}\right) > 0, \quad 0 < P_L^{ij} < 1, \tag{12}$$

$$f_1^L > 0, \ f_2^L < 0 \tag{13}$$

where $E(Y^j)$ is the expected income in migration destination *j*. The migration destination can either be rural or urban. C_{ij} is the cost of migration for moving from *i* to *j*. The cost of migration for rural dwellers is not only the monetary cost of settling in an urban place but also the psychological cost of the change in lifestyle. Factors such as distance to migration destination or settlement costs in *j* might increase C_{ij} and create a disincentive for migration. T^i is total agricultural land in *i* and the land that is not used by small farmers constitutes the land of large farmers in *i* ($T_i - T_{Si} = T_{Li}$).

If the share of small farmers in total farmers in *i* is $\lambda^i = N_{Si}/(N_{Si} + N_{Li})$ the probability of migrating from *i* to *j* for a random farmer in *i* becomes:

$$P^{ij} = \lambda^i f^S + (1 - \lambda^i) f^L \tag{14}$$

Under the assumption that the total land in *i* is constant (T_i^*), we can show the impact of increasing land share of small farmers (T_{Si}/T_i^*) on initial migration behavior as

$$\frac{dP^{ij}}{d(T_{Si}/T_i^*)} = \frac{T_i^*}{N_{Si} + N_{Li}}\left(f_1^L(\psi_1^{Li}T_{Li} + \psi^{Li}) - f_1^S(\psi_1^{Si}T_{Si} + \psi^{Si})\right) \tag{15}$$

e_{Li} and e_{Si} are land size elasticities of land productivity for large and small farms respectively and we define them as

$$e_{Li} = \psi_1^{Li}T_{Li}/\psi^{Li} \tag{16}$$

$$e_{Si} = \psi_1^{Si}T_{Si}/\psi^{Si} \tag{17}$$

Hence, the effect of increasing land share of small farmers on migration behavior is

$$\frac{dP^{ij}}{d(T_{Si}/T_i^*)} = \frac{T_i^*}{N_{Si} + N_{Li}}\left(f_1^{L'}{}_L\psi^{Li}(1 + e_{Li}) - f_1^S\psi^{Si}(1 + e_{Si})\right) \tag{18}$$

Moreover, the relationship between the share of small farmers (T_{Si}/T_i^*) and land Gini coefficient (G_i) in a district can be written as an identity equation (Appendix 1).

$$\frac{d(T_{Si}/T_i^*)}{dG_i} = \frac{1}{\varphi_i} < 0 \tag{19}$$

where

$$\varphi_i = \frac{dG_i}{d(T_{Si}/T_i^*)} = -\frac{(N_{Li}N_{Si}T_i^*)y^{Si}y^{Li}}{(N_{Li}y^{Li}+N_{Si}y^{Si})^2}\left(\frac{1+e_{Li}}{T_{Li}}+\frac{1+e_{Si}}{T_{Si}}\right) < 0 \quad (20)$$

Therefore, the effect of increasing land share of small farmers on migration behavior is

$$\frac{dP^{ij}}{dG_i} = \left(\frac{T_i^*}{N_{Si}+N_{Li}}\left(f_1^L\psi^{Li}(1+e_{Li}) - f_1^S\psi^{Si}(1+e_{Si})\right)\right)\frac{1}{\varphi_i} \quad (21)$$

The sign of dP^{ij}/dG_i is ambiguous and depends on the average land productivities, the farm size elasticities of land productivities in small and large farms and changing income's impact on the migration behavior of small and large farmers. The previous empirical work on the land productivity and migration might be suggestive of the sign of dP^{ij}/dT^{Si} for Kenya. A considerable number of studies (e.g. Cornia, 1985; Heltberg, 1998; Masterson, 2007; Ünal, 2012) for various countries find an inverse relationship between land size and land productivity. For Kenya, wa Gĩthĩnji, Konstantinidis & Barenberg (2014) empirically find that smaller farms have significantly higher land productivity. Therefore, we expect the average land productivity of small farms in Kenya to be greater ($\psi^{Si} > \psi^{Li}$).

However, wa Gĩthĩnji, Konstantinidis & Barenberg (2014)'s empirical estimations on Kenya exhibits a convex relationship between land size and land productivity, which suggests that the negative impact of larger land size on land productivity diminishes for larger land[10]. Therefore, e_{Si} might be smaller than e_{Li}, which would make the sign of dP^{ij}/dG_i ambiguous. Although the land productivity for large farms is expected to be smaller, a redistribution towards small farms could still reduce overall productivity. The reason for this is that an increase in the size of small farms could reduce their land productivity more than an increase in the land productivity of the larger farms.

Nevertheless, using cross-country evidence, Vollrath (2007) points out that the land productivity is greater in countries with smaller land inequality. Vollrath's empirical findings support the claim that a land redistribution in favor of small farms would increase overall land productivity and suggest $\psi^{Li}(1+e_{Li}) < \psi^{Si}(1+e_{Si})$ condition would hold.

The magnitude of the impact of changing expected incomes on large and small farmers' migration behavior (f_1^L and f_1^S respectively) is the third factor that determines the sign of dP^{ij}/dT^{Si}. A number of works (e.g. Harris, 1978; De Janvry, 1981; Galeano, 2009; Amsden; 1989, 1990; Oyvat, 2016) that discuss the relationship between agrarian structures and migration associate the changes in agrarian structures with the migration lower income peasants. Agesa and Agesa (2005) and Gray (2011)'s estimations on Kenya reflect the nonlinearities between migration likelihood and land area relationship in Kenya, which might show whether changing expected incomes have a larger influence on the migration behavior

[10] wa Gĩthĩnji, Konstantinidis and Barenberg (2014) tests the empirical relationship by using the logarithm of land productivity as a dependent and the logarithm of farm size as an independent variable. The empirical analysis based on household data finds coefficients of -0.32 and -0.40 between two variables. By taking the second derivative of land productivity with respect to farm size, we can show that the relationship between the land productivity and farm size is convex.

of smaller or larger farmers. For male individuals, Agesa and Agesa (2005) exhibit a positive and concave relationship between urban-rural earnings ratio and the probability of rural-to-urban migration. This suggests that an increase in the rural incomes affects the migration behavior of richer farmers less than poor farmers[11]. Similarly, Gray's (2011) estimations on Southwest Kenya also suggest that greater land size reduces probability of migration at a decreasing rate. In summary, both Agesa and Agesa (2005) and Gray (2011) show that changing land size affect the migration of small farmers more ($f_1^S > f_1^L$), which makes a positive sign for dP^{ij}/dG_i more likely.

The land inequality might also influence migration behavior through influencing the relative incomes regardless of its impact through the absolute incomes. As shown by D'Ambrosio and Frick (2007) and Luttmer (2005), the relative income position of individuals is an important determinant of happiness. Controlling for individual's own income, higher levels of neighbor incomes reduces individual's self-reported level of happiness. For this reason, the relatively deprived individuals are more likely to start a new life through migrating to another area (Stark and Bloom, 1985; Stark and Taylor, 1991). Moreover, as Stark (2006) shows, higher income Gini coefficient also leads to greater total relative deprivation, which would increase the incentives of migrating in a society. Consistent with Stark and Bloom (1985) and Stark and Taylor (1991), Bhandari (2004) for Nepal and Quinn (2006) for Mexico estimate that the individuals that have less access to land are more likely to migrate within their countries. For Poland, Stark, Micevska and Mycielski (2009) show that the individuals from areas with greater income inequality are more likely to migrate within and out of Poland.

The empirical evidence on Kenya also supports the claim that those who were born in more unequal rural areas are likely to migrate. Using the land Gini coefficients calculated from RLFS 1988, Table 4 exhibits the migration behavior for rural born adults for each range of home district land Gini coefficients. Although the relationship between the share of migrants and home district land Gini coefficient range is not linear, we can observe that the share of rural born adults who stayed in the rural areas in their origin is lower for those who were born in districts with a land Gini coefficient lower than 0.50. This relationship is more obvious for rural born household heads, since a greater share of rural born household heads migrated due to job and income related reasons.

Table 4 shows that a greater proportion of rural household heads born in the most inegalitarian rural areas migrated to villages in the other districts or smaller towns/cities. However, a similar correlation is not obvious for rural born household heads and adults, who migrated to the five largest urban areas (Greater Nairobi, Mombasa, Kisumu, Nakuru, and Eldoret) in Kenya. The behavior in migration towards larger cities might be different, because migration is not only a survival strategy for household. The "lights of cities" in Kenya might

[11] Using probit model, Agesa and Agesa (2005) test expected earnings' impact on probability of rural-to-urban migration. They find the coefficient for the difference between logarithms of expected wage for migrants in urban areas and non-migrants in rural areas of male as 2.8742. By taking the second derivative of migration probability with respect to ratio between expected urban to rural earnings, we can show that the relationship between expected urban to rural earnings to probability of migration is concave.

create extra incentives for migration (Agesa, 2001). The facilities in the larger city centers like Nairobi might pull higher income rural dwellers to those cities. This can be observed in Table 3, which shows that the share of migrants who moves to Greater Nairobi for better healthcare and education facilities is significantly larger (11.1%) compared to migration towards other areas. It may also be the case that the cost of migration and settlement to larger cities is significantly higher. So extremely high land inequality, which tends to be correlated with high rural poverty, may result in lower migration to large urban centers than moderately high land inequality.

Table 4: Shares of migration decisions of rural born household heads by the land Gini coefficients of their home districts (%) – *The land Gini coefficients from 1988/99*

	< 0.50	**0.50 - 0.60**	**0.60 - 0.70**	**> 0.70**
Rural to Greater Nairobi	3.45	10.86	5.34	6.52
Rural to MKNE	1.46	3.61	4.87	1.87
Rural to Mombasa	*0.52*	*1.41*	*3.00*	*0.65*
Rural to Kisumu	*0.25*	*1.18*	*0.58*	*0.00*
Rural to Nakuru	*0.55*	*0.76*	*0.57*	*0.50*
Rural to Eldoret	*0.15*	*0.26*	*0.72*	*0.73*
Rural to other urban	2.54	3.52	2.23	4.80
RURAL TO URBAN OVERALL	7.45	17.99	12.44	13.19
RURAL TO RURAL	9.68	12.55	18.07	19.90
NO MIGRATION	82.87	69.46	69.48	66.91

Notes: Authors' calculations from Kenya Integrated Household Budget Surveys in 05/06 and RLFS 88 Land Gini coefficients for 1988 exhibits the land inequality the land inequality for per capita land of each individual; however, it does not take ownership into account. A detailed explanation is made in the next section.

Rich and poor migrants do not have equal opportunities to access healthcare, education facilities, and other amenities in the larger cities. Béguy, Bocquier and Zulu (2010) show that households living in urban slums of Nairobi suffer from lacking education, water infrastructure and Archambult, De Laat and Zulu (2012) demonstrate that slums in Nairobi significantly lack electricity and sewage systems[12]. The slum dwellers also face bad health conditions due to the environmental destruction caused by industries around Nairobi (Mudege and Zulu, 2011) and lack of access to health services (Zulu et. al, 2011). Indeed, the infant mortality rates in Nairobi's slums were greater than the infant mortality rates in both urban and rural Kenya (Emina et. al, 2011)[13]. Moreover, based on interviews, Archambult, De Laat and Zulu (2012) indicate that the overwhelming majority in Nairobi's slums perceive widespread crime and practices like use of drugs as a strong disadvantage for raising children

[12] Based on 1989 and 1999 Kenya Census data, Archambult, De Laat and Zulu (2012) show that only 15.7% and 13.7% of married household heads have an access to electricity and sewage systems respectively.

[13] Emina et. al.(2011)'s work specifically focuses on Korogocho and Viwandani slums of Nairobi.

in Nairobi. Indeed, many of the slum dwellers believe that their home villages provide a more secure environment for their children. Households in the slums of Nairobi also suffer from high living costs and rising rents (Mudege and Zulu, 2011), which makes migration of poorer rural dwellers less desirable. Indeed, Béguy, Bocquier and Zulu (2010) show that the households who live in Nairobi's slums are more likely to leave Nairobi when they do not own a house. This suggests that the migration of the poor to larger cities is less likely to be permanent.

In summary, migration from rural areas to larger cities might be highly influenced by several different factors that cannot be easily tested. On top of the mechanisms suggested by our inequality-augmented Harris-Todaro model, higher living costs, unequal distribution of infrastructure facilities and higher crime rates might reduce poorer rural households relative desire for migrating to larger cities. This suggests that our inequality-augmented Harris-Todaro equation would explain migration from rural to other rural and smaller urban areas better.

3. Empirical Analysis

3.1 Data Description

The analysis below is based mainly on the Kenya Integrated Household Budget Survey (KIHBS) conducted in 2005/06. The survey covered 13430 households in all 70 districts and 1343 randomly selected clusters[14]. Given that our data on land inequality and per capita land area are available only at the district level, our study examines the factors that affect the decision of the household head who were "raised/brought up" in a village to migrate either to a rural area of another district or to an urban area. According to our model in Section 2.4, there isn't a reason for district based land inequality or per capita land to affect rural dwellers' decision to migrate to a village in the same district. For this reason, household heads who live in the rural areas of their district of birth are not considered to be migrants and we don't test the impact of land inequality and per capita land holding on rural to rural movement within a district. The district-to-district definition of migration is consistent with most national studies of migration in Kenya.

Our augmented Harris-Todaro equation predicts that both higher land inequality and smaller per capita land push rural dwellers to cities or/and other rural areas. Therefore, in our analysis we include the land Gini coefficients and per capita land of each district. To control for differences in the quality and thus potential differences in rural incomes in districts with similar land per capita and land distribution, we also include district level average rural farm and non-farm incomes of home districts. Ideally the measures of land and incomes would be from the year that the person migrated, as this would be a measure of the conditions the migrant faced. Since this is not available we proxy for this by using measures from an earlier data set on household incomes, land and agricultural activities the 1988 Rural Labor Force

[14] According to KIHBS 2005/06, among the 70 districts in Kenya, Nairobi and Mombasa are entirely urban.

Survey (RLFS) which is also a national representative data set. There are some limitations to this approach. Between 1988 and 2005/06, some of the districts were divided and new districts were formed. We estimated the land Gini coefficients and per capita lands in household heads' home districts in 1988 accordingly to the previous district classification. Moreover, data for a few districts was missing in the 1988 data, which reduced our sample size to 7110 household heads and 16013 adults in the estimations with 1988 data.

Our estimates control for several variables all of which are from the 2005/06 KIHBS data set. According to many studies (e.g. Hoddinott, 1994; McCormick and Wahba, 2005; Bowles, 1970) education significantly increases the possibility of rural dwellers' migration. This is because education has greater returns in the urban areas. Hence, we expect the education variable to explain rural-to-urban migration. In this study, we used years of schooling as the measure of education. We also control for household heads' marital status, age and gender. Many studies (e.g. McCormick and Wahba, 2005; Zhao, 1999) estimate that older rural dwellers are less likely to migrate, as the returns of migration declines with greater age. The studies on migration (Zhu, 2002; Zhao, 1999) also estimate that married individuals are less likely to migrate to other areas, either since migrating as a family is costlier or split migration is less desirable. Last, Gray (2011) finds that female in Kenya are more likely to migrate than male.

Table 5: Descriptive Statistics

Variable	No. of obs.	Mean	Standard Deviation	Minimum	Maximum
Land Gini - 1988	21632	0.590	0.091	0.437	0.861
Per capita land area - 1988	21772	1.407	0.905	0.416	17.149
Per capita rural income -1988	21771	5306	3712	2014	17851
Education (years of schooling)	19462	7.5	3.9	0	19
Age	27271	36.1	16.1	18	99
Married=1, Not married=0	27208	0.575	0.494	0	1
Male=1, Female=0	27271	0.478	0.500	0	1
Share of individual's religion (%)	24923	46.3	23.6	0	100
Time to Nairobi (min)	25085	258.0	176.1	0	1143

Cultural ties such as religion can also be important in the migration decision. Individuals living in communities with large numbers of their co-worshipers are less likely to migrate. The rural dwellers, who have members from their own religious organizations have stronger intra-community networks at the origin and thus are less likely to migrate (Neodörfer and Dresdner, 2014). To control for this, we calculated the population shares of religions in each district using KIHBS 2005/06. We expect that the rural dwellers, who were born in districts where their religions are more dominant would be less likely to migrate.

The distance to urban centers is another impediment to rural-to-urban migration. In Kenya the largest single destination is Nairobi, which post-1990s absorbs slightly over 25 per cent of all migration (Figure 3). The cost of going to Nairobi is likely to both influence the overall migration decision and the place to which one migrates. To proxy for this we control for the distance to Nairobi by road. Since roads can be of varying quality and therefore heavily influence the actual cost, we use time taken rather than distance. For example, two individuals in different districts may be equidistant from Nairobi but in the case of one the roads may be tarmacked highways while the other may have to travel a majority of the way on poorly maintained dirt roads. Our measure was calculated using the largest urban center within each district and using Google Maps estimates of the time taken to travel from the closest urban center to Nairobi[15].

3.2 Empirical results

We estimate the factors affecting probability of migration using simple and multinomial logit models. Individual *i*'s probability of choosing location *j* is given by

$$P_{ij} = \exp(\beta_j' X_i) \Big/ \left(1 + \sum_j \exp(\beta_j' X_i)\right) \tag{22}$$

where β_j is a vector of parameters, which may vary between location choices of X_i and is vector of characteristics of individual *i*.

Our first estimation focuses on rural-to-urban migration using a simple logit model, where $j = 0$ is staying in the rural sector and $j = 1$ is rural-to-urban migration. Our results are presented in Table 6. To check for robustness, we estimate the impact of the factors both for household heads and all adults. Our results are mainly consistent with the predictions of the augmented Harris-Todaro model we presented earlier. We find that household heads born in districts with more unequal land distribution, smaller per capita land and per capita rural income are significantly more likely to migrate to urban areas. A standard deviation increase in home district's land Gini coefficient raises the probability of moving from rural to urban by 16.6-17.1 percentage points. Moreover, consistent with the some of the previous work on migration, the coefficients of years of education and age are significantly positive and negative respectively. The sign for the share of migrant's religion in migrant's home district is significantly negative, which shows the individuals are more likely to migrate from places in which they are religiously different. While the results for all adults are consistent with the head of household results, they differ for marriage. Here being married is more likely to lead to migration. This result is possibly driven by married women, who migrate to join their husbands.

[15] A number studies including Dab and Seck (2009) for Mexico and Indonesia, Gupta and Mitra (2002) for India and Tunalı (1996) for Turkey show that distance to larger cities affect the migration behavior.

Table 6: Determinants of rural-to-urban migration in Kenya (no migration and migration to rural=0, migration to urban=1)

	ONLY HOUSEHOLD HEADS	*ALL ADULTS (18+)*
	(1)	(2)
Land Gini – *88*	1.832***	1.896***
	(0.648)	(0.448)
Log(Per capita land area) – *88*	-0.705***	-0.875***
	(0.205)	(0.142)
Log(Per capita rural income) – *88*	-0.455***	-0.454***
	(0.093)	(0.064)
Education	0.110***	0.109***
	(0.014)	(0.009)
Age	-0.045***	-0.022***
	(0.004)	(0.003)
Married	-1.173***	0.579***
	(0.162)	(0.086)
Male	0.980***	-0.142**
	(0.160)	(0.068)
Share of individual's religion(%)	-0.006**	-0.007***
	(0.002)	(0.002)
Log(Time to Nairobi)	0.236***	0.252***
	(0.086)	(0.057)
Constant	1.645**	-0.032
	(0.821)	(0.544)
No. of Observations	7110	16013
Wald chi2	252.63	328.84
Pseudo R2	0.1012	0.0557

Notes: All regressions include robust standard errors. The estimations are weighted according to the population weights of each observation. *,**, *** denote 10, 5 and 1% confidence levels, respectively.

We argued earlier that migration in Kenya and elsewhere is complex. It is not only rural-to-urban but can also be rural-to-rural, and further the destinations are not homogenous. For example, small urban centers which are dominated mainly by trading activities may be different from larger towns and cities that also have large government employment or/and significant employment in manufacturing or agro-processing plants. In rural areas, destinations may differ depending on the kind of agriculture that dominates (e.g. plantation versus smallholder farms or pastoral versus farming). These differences would affect the availability of opportunities for different migrants. To examine this, we will estimate a series of models that take into account different destinations. We will begin with the simplest model including both rural and urban destinations. This will be followed by models that further disaggregate the urban sector.

Table 7: Determinants of rural-to-urban and rural-to-rural migration in Kenya (no migration=0, migration to rural in another district=1, migration to urban=2)

	ONLY HOUSEHOLD HEADS		*ALL ADULTS (+18)*	
	(1)		(2)	
	Rural to rural	*Rural to urban*	*Rural to rural*	*Rural to urban*
Land Gini – *88*	3.117***	2.375***	1.617***	2.172***
	(0.614)	(0.664)	(0.409)	(0.456)
Log(Per capita land area) - *88*	-0.281	-0.758***	-0.180	-0.908***
	(0.173)	(0.208)	(0.118)	(0.144)
Log(Per capita rural income) – *88*	-0.040	-0.459***	-0.041	-0.460***
	(0.101)	(0.095)	(0.065)	(0.066)
Education	0.025**	0.114***	0.039***	0.114***
	(0.013)	(0.014)	(0.008)	(0.009)
Age	-0.003	-0.045***	0.011***	-0.020***
	(0.003)	(0.004)	(0.002)	(0.003)
Married	0.265**	-1.120***	0.765***	0.680***
	(0.133)	(0.166)	(0.072)	(0.086)
Male	-1.083***	0.756***	-0.955***	-0.289***
	(0.118)	(0.164)	(0.066)	(0.069)
Share of individual's religion(%)	-0.007***	-0.007***	-0.007***	-0.009***
	(0.002)	(0.002)	(0.001)	(0.002)
Log(Time to Nairobi)	0.211***	0.273***	0.269***	0.297***
	(0.077)	(0.088)	(0.050)	(0.058)
Constant	-3.231***	1.572*	-4.149***	-0.215
	(0.848)	(0.837)	(0.547)	(0.555)
No. of Observations	7110		16013	
Wald chi2	404.08		759.73	
Pseudo R2	0.0739		0.0617	

Notes: All regressions include robust standard errors. The estimations are weighted according to the population weights of each observation. *,**, *** denote 10, 5 and 1% confidence levels, respectively.

Our first model examines at the simplest level by differentiating between rural-to-urban migration and rural-to-rural migration. For this, we use a multinomial logit model, where $j = 0$ is staying in the rural sector and home district, $j = 1$ and $j = 2$ are migrating to rural areas in other districts and urban areas respectively. Table 7 reports the factors that influence rural-to-rural and rural-to-urban migration in Kenya. The signs of the land Gini coefficient are mainly consistent with Table 6. Larger land inequality in rural dweller's home district significantly increases possibility of migration both to urban and rural areas. Nevertheless, the magnitude of land inequality is larger for the regression on household heads. Overall, a standard deviation change in land distribution increases the probability of rural-to-rural and rural-to-urban migration by 21.5-28.2 and 14.6-19.7 percentage points respectively.

The coefficients for per capita land and per capita rural income are only significantly negative for rural-to-urban migration.

On the other hand, age only reduces rural dweller's probability of migration to urban areas as the long-term returns for moving to new sectors like industry and services are lower for older individuals. Moreover, the coefficient for years of education is greater for rural-to-urban migration, since the returns of education for urban jobs would be bigger. Last, similar to our earlier results, the rural dwellers are more likely to migrate if their religion in their home districts is less dominant.

We next test the behavior of migration to smaller towns/cities and larger city centers which have different structures and employment opportunities. We first use a multinomial logit model where $j = 0$ denotes staying in the rural areas and home district, and $j = 1$, $j = 2$ and $j = 3$ as migrating to rural areas in the other districts, urban areas other than Greater Nairobi, and Greater Nairobi[16].

Our results are reported in Table 8. For household heads, the land distribution in rural dweller's home district does not significantly explain migration to Greater Nairobi, it only has a significantly positive impact on migration to rural and other urban areas. For all adults, the size of coefficient for land Gini is significantly positive for migration to Greater Nairobi from rural areas; however, its size is significantly smaller than the land Gini's coefficient size on migration from rural to other areas[17]. This suggests that the profile of migrants to Nairobi may be different than that to other urban areas. As noted earlier the better amenities and the high cost of settlement may result in increasing the likelihood of higher income rural families migrating to Nairobi. These factors make the migration from rural to Nairobi more complicated than our inequality augmented Harris-Todaro equation and possibly weakens the coefficient of land Gini.

The impact of age is similar to previous estimates as it's only significantly negative both for migration to Greater Nairobi and migration to other urban areas. Nevertheless, the years of education has different impact on migration to different urban areas. Education has a significantly larger positive impact on migration to Greater Nairobi[18], which is consistent with McCormick and Wahba (2005)'s estimates on migration in Egypt. One reason for that might be that skilled jobs are mostly in Nairobi; whereas, migrants who move to other cities/towns mainly work in unskilled job in the services sector.

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[16] The urban areas that are less than one-hour distance to Nairobi are regarded as Greater Nairobi.

[17] We also estimated the logistic regression in Table 8 by taking migration from rural to Greater Nairobi as the base of the regression. For all adults, the coefficient for land Gini on rural to other urban migration is 1.627 and significant at 5%. This shows that, compared to migration to Greater Nairobi, the impact of land Gini coefficient is significantly larger for migration to other urban areas. We don't exhibit these results for the concerns of space.

[18] We also estimated the logistic regression in Table 8 by taking migration from rural to Greater Nairobi as the base of the regression. For both all adults and household heads, the coefficients for years of education were significantly negative at 1% level. This shows that the education's coefficient in Table 7 is significantly larger for migration to Greater Nairobi. We don't exhibit these results for the concerns of space.

Table 8: Determinants of rural-to-urban and rural-to-rural migration in Kenya (no migration=0, migration to rural in another district=1, migration to other urban=2, migration to Greater Nairobi=3)

	ONLY HOUSEHOLD HEADS			*ALL ADULTS(+18)*		
	(1)			(2)		
	Rural to rural	*Rural to other urban*	*Rural to Greater Nairobi*	*Rural to rural*	*Rural to other urban*	*Rural to Greater Nairobi*
Land Gini – *88*	3.121***	3.992***	0.780	1.618***	2.854***	1.227**
	(0.615)	(0.852)	(0.865)	(0.410)	(0.592)	(0.609)
Log(Per capita land area) - *88*	-0.282	-0.949***	-0.556**	-0.180	-0.892***	-0.820***
	(0.174)	(0.260)	(0.279)	(0.118)	(0.184)	(0.198)
Log(Per capita rural income) – 88	-0.043	-0.748***	-0.207*	-0.042	-0.652***	-0.257***
	(0.102)	(0.149)	(0.108)	(0.065)	(0.098)	(0.076)
Education	0.025*	0.007	0.199***	0.039***	0.047***	0.167***
	(0.013)	(0.018)	(0.019)	(0.008)	(0.011)	(0.013)
Age	-0.003	-0.035***	-0.055***	0.011***	-0.011***	-0.028***
	(0.003)	(0.005)	(0.006)	(0.002)	(0.003)	(0.004)
Married	0.270**	-0.755***	-1.399***	0.765***	0.689***	0.689***
	(0.133)	(0.162)	(0.240)	(0.072)	(0.106)	(0.127)
Male	-1.086***	0.293*	1.178***	-0.955***	-0.397***	-0.198**
	(0.119)	(0.163)	(0.255)	(0.066)	(0.087)	(0.097)
Share of individual's religion(%)	-0.007***	-0.004	-0.010***	-0.007***	-0.006***	-0.011***
	(0.002)	(0.003)	(0.003)	(0.001)	(0.002)	(0.002)
Log (Time to Nairobi)	0.213***	0.770***	-0.072	0.271***	0.796***	-0.039
	(0.077)	(0.112)	(0.114)	(0.050)	(0.078)	(0.074)
Constant	-3.222***	0.187	0.950	-4.151***	-2.369***	-0.431
	(0.849)	(1.249)	(1.058)	(0.547)	(0.825)	(0.697)
No. of Observations	7110			16013		
Wald chi2	486.82			907.89		
Pseudo R2	0.0834			0.0647		

Notes: All regressions include robust standard errors. The estimations are weighted according to the population weights of each observation. *,**, *** denote 10, 5 and 1% confidence levels, respectively.

Taken together our results on land inequality and education are quite illustrative of potential differences in the characteristics of migrants going to different destinations. Land inequality and the attendant lack of opportunities may provide the initial motivation for an individual to migrate, but then the individual has to choose a destination. Our results suggest that individuals who have low skills and are pushed out of their home rural district by the lack of land migrate to other rural areas or smaller urban centers. Migration to Nairobi, which is more expensive, seems to require higher skills and wealth.

Table 9: Determinants of rural-to-urban and rural-to-rural migration in Kenya (no migration=0, migration to rural in another district=1, migration to other urban=2, migration to Mombasa, Kisumu, Nakuru, Uasin Gishu=3, migration to suburban Nairobi area (Kiambu, Thika)=4, migration to metropolitan Nairobi area=5)

	ONLY HOUSEHOLD HEADS					*ALL ADULTS (+18)*				
	(1)					(2)				
	Rural to rural	*Rural to other urban*	*Rural to MKNE*	*Rural to suburban Nairobi*	*Rural to Metro Nairobi*	*Rural to rural*	*Rural to other urban*	*Rural to MKNE*	*Rural to suburban Nairobi*	*Rural to Metro Nairobi*
Land Gini – *88*	3.118***	3.318***	3.845***	7.658***	0.308	1.614***	2.205***	2.938***	6.096***	0.933
	(0.616)	(0.833)	(1.453)	(2.186)	(0.906)	(0.410)	(0.611)	(1.016)	(1.585)	(0.635)
Log(Per capita land area) - *88*	-0.282	-0.842***	-0.754	-1.591**	-0.472	-0.179	-0.734***	-0.857**	-1.566***	-0.765***
	(0.174)	(0.273)	(0.480)	(0.620)	(0.294)	(0.118)	(0.184)	(0.362)	(0.418)	(0.208)
Log(Per capita rural income) – 88	-0.043	-0.499***	-0.902***	-0.908***	-0.171	-0.042	-0.591***	-0.664***	-0.611***	-0.237***
	(0.102)	(0.118)	(0.254)	(0.331)	(0.112)	(0.065)	(0.088)	(0.166)	(0.204)	(0.078)
Education	0.025*	-0.017	0.028	0.043	0.210***	0.039***	0.036***	0.060***	0.038	0.175***
	(0.013)	(0.016)	(0.030)	(0.044)	(0.020)	(0.008)	(0.011)	(0.018)	(0.029)	(0.014)
Age	-0.003	-0.029***	-0.041***	-0.064***	-0.054***	0.011***	-0.005	-0.018***	-0.037***	-0.028***
	(0.003)	(0.005)	(0.008)	(0.014)	(0.006)	(0.002)	(0.003)	(0.006)	(0.014)	(0.004)
Married	0.270**	-0.892***	-0.559**	-0.704	-1.451***	0.764***	0.488***	0.929***	1.177***	0.661***
	(0.133)	(0.170)	(0.273)	(0.437)	(0.251)	(0.072)	(0.115)	(0.181)	(0.409)	(0.131)
Male	-1.084***	-0.031	0.666**	0.354	1.250***	-0.954***	-0.637***	-0.149	-0.096	-0.202**
	(0.119)	(0.163)	(0.296)	(0.388)	(0.271)	(0.066)	(0.088)	(0.146)	(0.233)	(0.102)
Share of individual's religion(%)	-0.007***	-0.006**	-0.001	-0.011*	-0.009***	-0.007***	-0.010***	-0.002	-0.017***	-0.011***
	(0.002)	(0.003)	(0.005)	(0.007)	(0.003)	(0.001)	(0.002)	(0.004)	(0.005)	(0.002)
Log (Time to Nairobi)	0.212***	0.200**	1.626***	-0.399**	-0.030	0.271***	0.352***	1.475***	-0.400***	-0.008
	(0.078)	(0.095)	(0.261)	(0.190)	(0.124)	(0.050)	(0.062)	(0.195)	(0.131)	(0.079)
Constant	-3.212***	1.130	-4.486*	4.530*	0.389	-4.150***	-0.630	-7.111***	0.425	-0.775
	(0.851)	(1.139)	(2.513)	(2.378)	(1.116)	(0.548)	(0.798)	(1.680)	(1.487)	(0.734)
No. of Observations			7110					16013		
Wald chi2			600.02					1045.01		
Pseudo R2			0.0860					0.0657		

Notes: All regressions include robust standard errors. The estimations are weighted according to the population weights of each observation. *,**, *** denote 10, 5 and 1% confidence levels, respectively.

Given our results on Nairobi, we do a further disaggregation of urban areas. We group the four largest centers after Nairobi together. These towns are important regional centers containing significant government employment as well as some manufacturing. In addition, we include separately what we have called suburban Nairobi, which is the area around Nairobi that is a mixture of agricultural and urban areas. This area has increasingly become an important as a source for agricultural goods for Nairobi as well as for cheaper accommodation for workers for Nairobi.

Our results for the multinomial logit model in which, $j = 0$ is staying in the rural areas and home district, $j = 1$ is migration to rural areas in the other districts, $j = 2$ is migration to urban areas other than top 5 cities, $j = 3$ is migration to Mombasa, Kisumu, Nakuru, Eldoret, $j = 4$ is migration to suburban Nairobi area (Kiambu, Thika), $j = 5$ is migration to metropolitan Nairobi area are in Table 9. The estimates show that the impact of higher land inequality and per capita land area are strongest for the migration to suburban Nairobi area (Kiambu, Thika).

Table 9 confirms the complexity of migration decisions and the importance of considering the destinations when examining the decisions. First, it reaffirms the importance of land inequality and distribution in the migration process. With the exception of Metro Nairobi, migration is driven by land inequality. Higher land inequality tends to push individuals to areas with higher degree of urbanization, with the largest impact being those who choose suburban Nairobi as the destination. On the other hand, the decisions to migrate to Metro Nairobi are dominated by education. This is possibly due to the higher cost of settling in Metro Nairobi and the competition for employment. Being successful requires higher skills, savings and networks. Moving to Metro Nairobi is thus a less preferable strategy for the rural poor with low education.

An examination of the profile of rural born migrants by destination brings this out quite clearly. Those going to Metro Nairobi have a median education of 10 years a full 3 years more than those going to suburban Nairobi[19]. The land inequality and per capita land holdings in their home districts of Metro Nairobi migrants are also respectively larger and smaller than the land inequality and per capita land holdings of those who migrated to suburban Nairobi[20]. On the other hand, there is no difference in education between those who migrate to suburban Nairobi and those who do not migrate. Both groups have median year of education of 7 years. However, average land holdings are substantially smaller and average land inequality is larger in the home districts of the suburban Nairobi migrants[21].

[19] Authors' calculations from the Kenya Integrated Household Budget Survey (KIHBS) - 2005/06.

[20] According to our calculations, the average land Gini coefficients of 1988 in the home districts of those who migrated to Metro Nairobi and suburban Nairobi were respectively 57.9 and 60.2. The average land for Metro Nairobi migrants' home districts was 1.29, whereas the average land for suburban Nairobi migrants' home districts was 1.14.

[21] According to our calculations, the average land Gini coefficients of 1988 in the home districts of those who migrated to suburban Nairobi and rural dwellers who did not migrate were respectively 60.2 and 58.3. The average land for suburban Nairobi migrants' home districts was 1.14 and the average land of rural dwellers who did not migrate was 1.38.

Table 10: Determinants of rural-to-urban and rural-to-rural migration in Kenya (no migration=0, migration to rural in another district=1, migration to other urban=2, migration to Mombasa, Kisumu, Nakuru, Uasin Gishu=3, migration to suburban Nairobi area (Kiambu, Thika)=4, migration to metropolitan Nairobi area=5)

	MALE ADULTS (+18)					*FEMALE ADULTS (+18)*				
	(1)					(2)				
	Rural to rural	*Rural to other urban*	*Rural to MKNE*	*Rural to suburban Nairobi*	*Rural to Metro Nairobi*	*Rural to rural*	*Rural to other urban*	*Rural to MKNE*	*Rural to suburban Nairobi*	*Rural to Metro Nairobi*
Land Gini – *88*	3.332***	3.992***	3.117**	6.717***	0.827	0.649	0.972	2.619*	5.075**	0.821
	(0.675)	(0.919)	(1.410)	(2.174)	(0.888)	(0.515)	(0.820)	(1.486)	(2.312)	(0.909)
Log(Per capita land area) - *88*	-0.253	-1.358***	-0.837*	-1.496**	-0.681**	-0.139	-0.334	-0.856	-1.580***	-0.808***
	(0.186)	(0.259)	(0.505)	(0.600)	(0.309)	(0.152)	(0.248)	(0.524)	(0.554)	(0.280)
Log(Per capita rural income) – 88	0.063	-0.399***	-0.784***	-0.630**	-0.205*	-0.099	-0.714***	-0.542**	-0.547*	-0.265**
	(0.110)	(0.108)	(0.236)	(0.272)	(0.115)	(0.082)	(0.123)	(0.235)	(0.306)	(0.108)
Education	0.023	0.001	0.045	0.103**	0.210***	0.045***	0.051***	0.066***	-0.041	0.138***
	(0.014)	(0.015)	(0.029)	(0.045)	(0.020)	(0.010)	(0.015)	(0.022)	(0.034)	(0.020)
Age	0.010***	-0.007	-0.019**	-0.050***	-0.028***	0.012***	-0.007	-0.024***	-0.034*	-0.031***
	(0.004)	(0.005)	(0.009)	(0.015)	(0.007)	(0.002)	(0.004)	(0.009)	(0.020)	(0.005)
Married	0.688***	0.871***	1.450***	2.155***	0.902***	0.802***	0.333**	0.593***	0.572	0.442***
	(0.145)	(0.158)	(0.289)	(0.502)	(0.243)	(0.083)	(0.143)	(0.227)	(0.479)	(0.158)
Share of individual's religion(%)	-0.008***	-0.009***	-0.005	-0.018***	-0.009***	-0.006***	-0.011***	0.002	-0.017**	-0.012***
	(0.002)	(0.003)	(0.005)	(0.007)	(0.003)	(0.002)	(0.003)	(0.005)	(0.007)	(0.003)
Log (Time to Nairobi)	0.144*	0.255***	1.433***	-0.429**	0.057	0.336***	0.414***	1.505***	-0.397**	-0.073
	(0.080)	(0.093)	(0.300)	(0.182)	(0.116)	(0.065)	(0.079)	(0.249)	(0.183)	(0.109)
Constant	-6.000***	-2.894***	-6.258**	-0.649	-2.185**	-3.653***	0.543	-7.884***	1.339	0.545
	(0.890)	(0.953)	(2.473)	(2.298)	(1.058)	(0.692)	(1.148)	(2.288)	(1.973)	(1.023)
No. of Observations			7850					8163		
Wald chi2			482.22					537.15		
Pseudo R2			0.0715					0.0491		

Notes: All regressions include robust standard errors. The estimations are weighted according to the population weights of each observation. *,**, *** denote 10, 5 and 1% confidence levels, respectively.

There is also strongly matters for rural-to-urban. In fact, the mean age for the groups is perfectly correlated with the degree of urbanization of destination. Those who migrate to MKNE and other urban areas are slightly older, while there does not seem to be a difference between those who migrate to other rural areas and those who do not migrate. Second, rural-to-rural migration includes a larger number of women migrating than rural-to-urban, which is heavily male dominated. While migration to five largest urban centers (Nairobi, Mombasa, Kisumu, Nakuru, Eldoret) is 82.6 per cent male, migration to other urban centers and rural areas are 67.5 per cent and 58.8 per cent male respectively[22]. The third difference is that while marriage decreases the possibility of rural heads of households moving to urban areas, it increases the possibility of female heads of households moving to other rural areas. Moreover, distance from Nairobi matters. The further you are away from Nairobi the less likely you are to migrate to Nairobi and more likely to migrate either to another rural area or urban center.

Our last multinomial logit model reports the factors affecting the migration of male and female separately in Table 10. Compared to the regressions for all adults in Table 9, the coefficient sizes of land inequality are smaller and insignificant at 5% for adult females except for the estimation on migration to suburban Nairobi. Moreover, the coefficient size of per capita land area for rural to other urban areas is around four times greater for males compared to females. This is consistent with the finding that, unlike migration of males, income and job related reasons are not the dominant determinants for female migration. It is also the case that women are unlikely to migrate for land when faced with a shortage of land in their home district as most Kenyan communities are patriarchal and access to land is often through a male member of the family, therefore making it difficult for a woman to migrate solo in search of land. Marriage also is an important reason of female migration (Table 3). Nevertheless, our regressions still do not disprove the impact of income related factors on female migration as the signs of land inequality, per capita land and per capital income are respectively positive, negative and negative for female migration. Table 10 also shows that the impact of education on migration to areas other than Nairobi is only significant for female rural dwellers.

4. Conclusion

This paper examines the factors behind migration in Kenya. Consistent with Harris and Todaro (1970), a number of studies have shown that expected urban and/or rural incomes in Kenya influence the migration of Kenyan rural dwellers (Agesa, 2000; 2001; Agesa and Agesa, 1999; Bigsten, 1996; Gray, 2011). Our study makes a number of contributions to the study of migration in general and in the African and Kenyan cases more specifically. First and foremost, it reaffirms the complexity of migration and the need to break out of the rural-urban

[22] Authors' calculations from the Kenya Integrated Household Budget Survey (KIHBS) - 2005/06.

duality that has imprisoned much of development thinking (wa Gĩthĩnji 2000). In particular, we note the relatively large rural-to-rural migration that has been given relatively little attention in national studies. Second, unlike the previous studies on Kenya and following the theoretical arguments of Griffin, Khan and Ickowitz (2002), De Janvry (1981), Harris (1978), Galeano (2009), Amsden (1989), Keyder (1987), Oyvat (2016) and Stark (2006), this study also examines the impact of land distribution on migration behavior. We conclude that both higher land inequality and lower per capita land in the home districts of Kenyan households' heads increase the household heads' probability of migrating. The significance and magnitudes of land inequality and per capita land's impact on migration is different depending on destination. We strongly conclude that higher land inequality pushes rural dwellers to other rural areas, and less populated cities/towns. This movement is driven by the similar type of activities that are available in these destinations for low skilled land constrained individuals. However, the evidence on influence of land distribution on the migration from rural areas to Nairobi is weak. Our estimates suggest that migration to suburbs of metropolitan areas might be a strategy for benefitting from job opportunities in metropolitan areas without facing high living costs. Moreover, the impact of land inequality loses its magnitude and significance, when we make estimations for only female adults. This is possibly because marriage is also an important determinant of female migration. Third, we show empirically for the first time in the context of an African country that the time taken to travel as a proxy of the costs of migration matters and strongly affects destination.

Our findings have a number of implications and considerations for policy makers. First, rural poverty and inequality are transmitted via migration to other rural and urban areas. Poverty and inequality in Kenya over time are thus more likely in the future to be an urban dominated phenomenon. Second, the results suggest that migration is a survival strategy for poorer rural households living in areas that are more unequal and that lack land. Therefore, policies like subsidizing small peasantry and progressive land reforms can have a positive long-term influence for reducing poverty, and this effect would spread to a large part of Kenya. This is particularly important in the context of a policy environment that favors land consolidation and large farms and thus accentuates inequality. These kinds of policies are likely to also have an impact on increasing migration. Last, education is central in determining the destination of migration. Those who migrate to Metro Nairobi have significantly higher levels of education. This suggests that the opportunities for the highly educated are not broadly spread. Policies that spread complex economic activities to urban areas other than Nairobi are likely to spread the migration of highly educated people across the country with likely multiplier effects. Here the on-going process of devolution is of importance. If it is to be successful, then it must create opportunities to attract highly educated migrants to other urban centers other than Nairobi.

Appendix 1

The equation for Gini coefficient (G_i) in district *i,* that formed by small and large farmers, is

$$G_i = \frac{2}{N_i^2 \overline{y_{ik}}} \left(\sum_{k=1}^{N_i} k\left(y^{ik} - \overline{y_{ik}}\right) \right) \tag{A1}$$

where y^{ik} is in ascending order. y^{ik} is the income of each farmer (k), and $\bar{y}_{ik}$ is the average income in district i. The total number of farmers in each district i is N_i.

Since each district is formed by identical small (S) and large farmers (L), the land Gini coefficient for district i can be rewritten as:

$$G_i = \frac{(y^{Li} - y^{Si})(N_{Li}N_{Si})}{(N_{Li}+N_{Si})(N_{Li}y^{Li} + N_{Si}y^{Si})} \tag{23}$$

The land shares of small and large farmers can also be rewritten as the following for each district:

$$y^{Si} = \frac{\frac{T_{Si}}{T_i^*} T_i^* \psi^{Si}((\frac{T_{Si}}{T_i^*})T_i^*, K_{Si}, N_{Si})}{N_{Si}} \tag{A3}$$

$$y^{Li} = \frac{\frac{T_{Li}}{T_i^*} \psi^{Li}\,((\frac{T_{Li}}{T_i^*})T_i^*, K_{Li}, N_{Li})}{N_{Li}} \tag{A4}$$

Considering that the total area, capital and number of small and large farmers in each district are constant, the relationship between the share of small farmers (T_{Si}/T_i^*) and land Gini is

$$\varphi_i = \frac{dG_i}{d(T_{Si}/T_i^*)} = -\frac{(N_{Li}N_{Si}T_i^*)y^{Si}y^{Li}}{(N_{Li}y^{Li} + N_{Si}y^{Si})^2}\left(\frac{1+e_{Li}}{T_{Li}} + \frac{1+e_{Si}}{T_{Si}}\right) < 0 \tag{A6}$$

since an increase in land size is not expected to reduce production in a farm ($e_{Li} > -1$, and $e_{Si} > -1$).

Following this we can frame the relationship between the share of small farmers and Gini coefficient as an identity equation, which can be rewritten as

$$\frac{d(T_{Si}/T_i^*)}{dG_i} = \frac{1}{\varphi_i} < 0 \tag{A7}$$

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