Intra-Rural Migration in Tanzania and Pathways of Welfare Change

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Abstract
Migration between rural locations is prevalent in many developing countries and has been found to improve economic well-being in sub-Saharan Africa. This paper explores the pathways through which intra-rural migration affects welfare in rural Tanzania. Specifically, we investigate whether such migration enables migrants to access more land, higher quality land, or greater off-farm income generating opportunities that may, in turn, translate into improved welfare. Drawing on a longitudinal data set that tracks migrants to their destinations, we employ a difference-in-differences approach, validated with a multinomial treatment effects model, and find that migration confers a benefit in consumption to migrants. Results do not indicate that this advantage is derived from larger farms, though intra-rural migrants to more densely populated areas do seem to achieve more productive farmland at their destinations. Across all destinations, migrants are more likely to draw from off-farm and non-farm income sources, suggesting that even intra-rural migration represents a shift away from agriculture, and this is likely the dominant channel through which migrants benefit. We conclude that intra-rural migration merits greater attention in the discourse on rural development and structural transformation.

Keywords: internal migration, land access, poverty, rural nonfarm economy, Tanzania
JEL codes: G61, I32, O15, Q15

1. Introduction

Despite a promising reduction in Tanzania's national poverty rate, falling from 34 to 28% during the 2007 – 2011/12 period, the rural poverty rate remains relatively high at 33%. Furthermore, a majority of Tanzania's poor population (84%) resides in rural areas (World Bank 2015). Over half of the rural poor rely on subsistence agriculture for their livelihoods (ibid), suggesting that improving agricultural opportunities and outcomes should be central to any poverty reduction program. As well, the process of structural transformation, in which societies transition to a higher-income economic base with a small but productive agricultural sector, is accompanied by the movement of labor out of agriculture. Often, this takes the form of relocation from rural to urban areas (de Brauw et al. 2014). Poverty reduction programs therefore need to also account for the role of migration in economic development. Yet gaps remain in our knowledge of how rural people manage to exit poverty, and in particular, the role of different types of migration as a conduit to greater economic well-being.[1] This paper seeks to fill this gap by exploring the pathways through which intra-rural migration may be used to achieve a higher level of consumption.

As will be discussed, intra-rural migration is prevalent in developing countries (Lucas 2015), and migration has been found to improve economic well-being in sub-Saharan Africa, even for those who move to a rural area (Beegle et al. 2011; Garlick et al. 2015). This suggests that it may be labor mobility rather than rural-to-urban movement *per se* that drives improvements in welfare. Given the importance of migration to rural livelihoods, it is imperative to better understand the pathways, or transmission channels, through which intra-rural migration may improve welfare. In this paper, we highlight three

[1] Throughout this paper, consumption is treated as a proxy for welfare, and the terms 'welfare' and 'economic well-being' are used in the same manner.

possible channels. Migrants' consumption may improve due to a ***land expansion effect*** if they increase their farm size by moving to areas with greater land availability; a ***productivity effect*** if they acquire higher yielding farmland by moving to areas with favorable agricultural potential; and/ or a ***diversification effect*** if they incorporate off-farm income sources into their livelihood portfolio by moving to areas with greater off-farm economic activity. We use nationally representative longitudinal data from Tanzania to assess whether migration affects consumption, and to examine these potential avenues of welfare improvement. As a preview of our results, we find no evidence of an expansion effect and limited evidence that migrants achieve greater agricultural productivity through migration. However, intra-rural migrants do tend to incorporate more off-farm work into their income portfolios once they reach their destinations, and this seems to be the dominant channel through which migration confers an improvement in consumption.

This paper makes several contributions to the existing literature on internal migration in developing countries. First, although migration within and from the Kagera region of northwestern Tanzania has been well-documented (Beegle et al. 2011; Christiaensen et al. 2013; Hirvonen and Lilleør 2015; Wineman and Liverpool-Tasie 2015), owing mostly to a unique 19-year longitudinal data set, this paper extends the focus to the entire Tanzanian population. This provides a wider context within which to understand the case-study results from a specific region. Second, to our knowledge, no other study explores the highly policy-relevant question of the alternative channels through which intra-rural migration affects migrants' welfare. Rather than asking only *whether* migration improves welfare (Beegle et al. 2011; de Brauw et al. 2013; McKenzie et al. 2010), we explore *how* a migrant's welfare is affected. This allows for more nuanced policy implications than would otherwise be obtained. Third, we extend the identification strategy of Beegle et al. (2011) by regarding migration to various destinations (i.e., urban center or more/ less remote rural location) as a multinomial variable and addressing endogeneity within a multinomial treatment effects model. This allows us to better identify the welfare effects of each type of migration.

The remainder of the paper is organized as follows. Section 2 includes a literature review of the effects of migration and potential channels through which intra-rural migration may benefit migrants. Section 3 provides a simple conceptual framework and our research hypotheses. A description of the data and identification strategy is given in section 4. Section 5 presents the results, including descriptive statistics, econometric results, and a set of robustness checks. Section 6 concludes with a discussion of the results, directions for future research, and policy implications.

2. Background

In the economic development literature, people in rural Africa are commonly assumed to be either stationary or in the process of migrating between the rural and urban sectors. This seems to reflect traditional two-sector models of development, such as the Lewis model of labor transition from the 'subsistence' to capitalist sector (Lewis 1954), or the Harris-Todaro model of migration to the urban sector (Harris and Todaro 1970). These have inspired extensive study of rural-to-urban wage migration and its role in structural transformation (e.g., de Brauw et al. 2014). However, the literature on migration focuses predominantly on flows between rural areas and urban centers (de Haan 1999), with less attention paid to seasonal or temporary intra-rural migration (de Bruijn and van Dijk 2003; Hampshire and Randall 1999), and even less given to patterns of long-term migration across the countryside.

Yet intra-rural migration is prevalent in many developing countries (Bilsborrow 1998; Lucas 2015), and is recognized in sub-Saharan Africa as the most common of the four major types of movement (e.g., rural-urban, urban-urban, and urban-rural) (Oucho and Gould 1993). This pattern has been observed in Botswana in the 1980s (Lesetedi 1992, cited in de Haan 1999), Ghana in the 1990s (Sowa and White 1997, cited in de Haan 1999) and Burkina Faso in the early 2000s (Henry et al. 2004). More recently in South Africa, two-thirds or all movements from rural households were to another rural destination (Garlick et al. 2015). In the Kagera region of northwestern Tanzania, Hirvonen and Lilleør (2015) find that almost half of the population moved from their initial village during a 10-year interval, with 74% of rural migrants settling in another rural area. Also in the same region, Wineman and Liverpool-Tasie (2015) find that over one-third of rural households can be classified as first-generation migrants. With an average of 18 years spent in the destination village, such moves are far from temporary.

What explains these migration flows within the rural sector? Several influential models begin with the proposition that people move in order to maximize their expected incomes (Harris and Todaro 1970; Sjaastad 1964). Recently, a number of studies have concluded that migration improves economic well-being for migrants in sub-Saharan Africa, thereby establishing migration as a 'pathway out of poverty'. For example, Beegle et al. (2011) examine migrant tracking data over 13 years in Tanzania and find that migration results in 36% higher consumption, relative to remaining in the community. While this effect is larger for those moving to urban areas, the benefit persists even for those who move to a more remote (less well-connected) area. Similar conclusions have been reached in Ethiopia (de Brauw et al. 2013) and South Africa (Garlick et al. 2015). As noted by Beegle et al. (2011), "clearly, it matters where people move, but moving in itself seems to matter too." However, little is known about the dynamics of intra-rural migration (Lucas 1997), including what, precisely, happens along the way that facilitates upward mobility.

As noted in the introduction, we first assess whether intra-rural migrants in Tanzania achieve an improvement in consumption, and then whether this seems to occur through three transmission channels: They may obtain larger farms by moving to areas with greater land availability and lower land prices (a land expansion effect); they may obtain higher yielding farmland by moving to more productive areas (a productivity effect); and/or they may incorporate off-farm income sources into their livelihood portfolio by moving to areas with greater off-farm economic activity (a diversification effect). We now discuss these in turn.

Across rural sub-Saharan Africa, a strong relationship has been found between land access and household income (Jayne et al. 2003; Muyanga and Jayne 2014). At the same time, evidence of rising land pressures and declining median farm sizes has surfaced in a number of countries (Jayne et al. 2003; Jayne et al. 2014). In Kenya, for example, where 40% of the rural population resides on just 5% of the rural land, Muyanga and Jayne (2014) note that farm sizes have been gradually shrinking as household land endowments are subdivided with each generation. Rising population densities are correlated with lower incomes and, beyond a certain threshold, with decreasing labor productivity. This pattern suggests that residents may be able to improve their incomes by shifting to another area with readily accessible land, effectively equilibrating labor-to-land ratios over space (Jayne et al. 2014).

Along these lines, Jayne and Muyanga (2012) find that the most densely populated villages in Kenya see a significantly higher net outflow of labor. In Malawi, Potts (2006) explicitly attributes several decades of intra-rural migration flows to increasingly serious land shortages in the south. In Tanzania, land-constrained residents are seen to migrate farther than those with greater landholdings (Beegle et al. 2011), suggesting that land pressure is among the drivers of outmigration. In a unique study of migrants who have settled in rural Tanzania, Wineman and Liverpool-Tasie (2015) find that the desire for more (and more productive) land stands out as a prime motivation for such migration, and migrant households are observed to amass slightly larger landholdings than their non-migrant neighbors, primarily through the market (Wineman and Liverpool-Tasie 2016). At the same time, there may be impediments to intra-rural migration motivated by land access. Tribal or cultural differences across regions, and local resistance to land purchases by newcomers could present an obstacle to joining a new community. And farmers may be unwilling to trade the benefits of living in a more densely populated area, such as access to amenities and a more vibrant social scene, for the benefits of enhanced land access in a relatively remote area. Wineman and Liverpool-Tasie (2015) note, for example, some reluctance of rural migrants to settle in areas with few neighbors and, accordingly, limited security from bandits and wildlife attacks.

In a second transmission channel, we propose that intra-rural migrants may achieve an improvement in consumption by migrating to areas with greater land productivity. This argument mirrors the rationale for the land expansion effect, and may take the form of moving to areas of better soil fertility, more favorable rainfall patterns, a lower prevalence of crop disease, or any other factor that contributes to greater agricultural potential. As noted by Barrett and Bevis (2015), there exists a strong link between soil quality and economic well-being, with poor soils directly limiting labor productivity and farm income. In fact, a degraded natural resource base can constitute a poverty trap, in which low-nutrient soils are unresponsive to labor or fertilizer inputs, and farmers are compelled to respond with continuous cultivation that further degrades the soil – a classic negative feedback cycle (Barrett and Bevis 2015; Titonnell and Giller 2013). If more productive land is available elsewhere, migration may present an exit from this cycle, placing migrants on a more favorable economic trajectory than non-migrants. In Uganda, Baland et al. (2007) speculatively attribute high levels of intra-rural migration to the search for more productive land. Nevertheless, farmers may have difficulty transferring their skills to a very different agro-climatic setting (Jayne et al. 2014). Indeed, Bazzi et al. (2014) find that intra-rural migrants in Indonesia are more successful when they have relocated to areas of similar agro-climatic conditions.

The final transmission channel we explore is that of income diversification, whereby intra-rural migrants may shift within the rural sector to larger villages with greater off-farm income generating opportunities. The relevance of rural nonfarm income and employment is widely recognized (Haggblade et al. 2007), and the agricultural transformation is often characterized by growth in the off-farm/ non-farm earnings of farm households. Poor rural residents may find migration to large villages and secondary towns[2] preferable to urban migration for several reasons, including lower migration costs, the ability to maintain social connections with their original communities, lower search costs associated with job-hunting, and a higher likelihood of finding a job for which they are qualified (Christiaensen and Todo 2014). In both Ethiopia and Uganda, the workforce in rural towns tends to be unskilled or semi-skilled, as compared with a more skilled workforce in cities (Dorosh and Thurlow 2012). Although migration to rural hubs of

[2] As will be discussed in section 4.2, the official definition of 'rural' in Tanzania excludes places recognized as secondary towns.

nonfarm economic activity is less visible than rural-to-urban migration flows, the rationale for such movement mirrors that of moving to urban centers.

Recent evidence even suggests that the shift away from farm-based livelihoods and migration to secondary towns is associated with a greater reduction in poverty than rural-to-urban migration. In the Kagera region of Tanzania, where the poverty rate fell by 28% over 19 years, almost half of this decline could be attributed to farmers either transitioning into the rural nonfarm economy or migrating to secondary towns (Christiaensen et al. 2013). The authors refer to these smaller towns as 'the missing middle',[3] as they are often overlooked in the literature on internal migration and structural transformation. In a cross-country study of developing countries, Christiaensen and Todo (2014) similarly find that a sectoral/geographic shift out of agriculture into rural nonfarm activities and to secondary towns is associated with a national reduction of poverty, while the same cannot be said for migration to larger cities.

3. Conceptual framework and research questions

In this paper, we regard migration as an individual strategy, such that the migrant (rather than the migrant-sending household) is the appropriate unit of analysis. This is consistent with the conceptualization of migration in several influential models (Harris and Todaro 1970; Sjaastad 1964). At the same time, as rural households tend to generate income jointly (e.g., farm production or family businesses) and pool resources, consumption is captured at the household level and then scaled to reflect the individual welfare of household members. Higher income is understood to be correlated with greater consumption. We begin with a simple conceptual framework that itemizes the various sources of income of a rural household/ individual, noting the factors that may be influenced through intra-rural migration. Income is collected from several possible sources, including crop production, livestock production, and off-farm income sources, such as businesses or wage/ salary employment.

$$\begin{aligned} Income = \ & Income_{crop}(Land\ area, Land\ quality, Labor_{crop}) \\ & + Income_{livestock}(Livestock, Labor_{livestock}) \\ & + Income_{off-farm}(Off-farm\ opportunities, Labor_{off-farm}) \end{aligned} \quad (1)$$

Each type of income is a function of several factors, specified inside the parentheses, and these are all positively related to income from a given source. For example,

$$\frac{\partial Income_{crop}}{\partial Land\ area} > 0, \frac{\partial Income_{crop}}{\partial Land\ quality} > 0, \frac{\partial Income_{off-farm}}{\partial Off-farm\ opportunities} > 0 \quad (2)$$

Note that several of these factors can be adjusted through migration (as well as through other actions). Thus, by migrating to a new location, a rural individual can alter his/her land area accessed, farmland quality, and the off-farm income-generating opportunities available.

In this paper, we first assess whether migrants seem to achieve higher consumption (economic well-being), and then examine the channels through which intra-rural migration can benefit migrants. We evaluate three hypotheses:

(1) Migrants within the rural sector achieve larger land areas, where area is scaled to household size.
(2) Migrants within the rural sector achieve higher quality farmland.

[3] Christiaensen et al. (2013) adopt a relatively conservative definition of 'urban', defining urban centers as those with populations of at least one half million.

(3) Migrants within the rural sector incorporate more off-farm income into their income portfolios.[4]
In each case, we *assume* a positive relationship between the transmission channel and consumption, with reference to the existing literature (section 2). Note that these are not the only channels through which migration may affect consumption. For example, intra-rural migrants may move to less remote locations where, holding all else constant, they are able to sell farm output with lower associated transport costs. For livestock holders, a reduced disease burden or access to better communal grazing lands in a new location can also bring benefits. We do explore the extent to which migration is associated with changes in market access conditions, such as distance to the district headquarters. However, it is beyond the scope of this paper to explore every possible channel of welfare improvement.

4. Data and identification strategy

4.1 Data sources

This study draws primarily from two waves of the Living Standards Measurement Survey (LSMS) for Tanzania, a nationally representative longitudinal data set collected between 2008/09 and 2012/2013. The LSMS is implemented by the Tanzania National Bureau of Statistics, and is a research initiative within the Development Economics Research Group of the World Bank. The LSMS captures a rich set of information on household consumption, asset holdings, and income-generating activities, as well as detailed information on agricultural production. After the first round of data collection, the survey proceeds to track all household members that were at least 15 years old, including individuals that had split off from their original households and entire households that had relocated. It thus becomes an individual-level longitudinal survey, capturing information for the entire household of each individual who had been interviewed in an earlier round. This phenomenal tracking survey provides a unique opportunity to explore the dynamics of migration.

The original sample included 3,265 households, of which 2,063 were rural. This paper focuses on these rural households and the 5,202 working-age (ages 15-64 (World Bank 2015)) individual household members therein. As will be explained in section 4.3, we use only the first and third waves of this survey, collected in 2008/09 and 2012/13. Relative to drawing from the intervening survey wave, this approach maximizes the amount of time migrants are likely to have spent in their new locations before we assess whether migration has been accompanied by an improvement in consumption. By 2012/13, 4,844 individuals from our study population were re-interviewed, producing a re-interview rate of 93.2%. Population weights are included in all analyses, and are adjusted for the likelihood of attrition using inverse probability weights (Wooldridge 2002). Unfortunately, the LSMS data set does not track international migrants. This may bias our results, as we do not observe the outcomes of longer-distance migrants. However, a similar data set from the Kagera region (the Kagera Health and Development Survey) that did track international migrants in 2004 found that just 2% of re-interviewed individuals had moved outside the country (Beegle et al. 2011). Especially because we focus on rural households, we do not expect to be missing a substantial number of international migrants. Some observations are dropped due to incomplete surveys and unreasonable responses, leaving a final sample size of 4,742.[5]

[4] Only hypothesis 3 is investigated by referring to income-generating activities at the individual (as well as the household) level, while hypotheses 1 and 2 are necessarily investigated with household-level information.
[5] This sample size may change upwards in future drafts if we are able to impute missing observations and thereby salvage interviews that were dropped.

Appended to the LSMS data set are additional data drawn from other sources. These include local population density estimates (from WorldPop), distance to the district headquarters (from statoids), long-term average climate variables (from WorldClim), annual climate outcomes (from the National Oceanic and Atmospheric Administration), and information on soil quality (from the International Institute for Applied Systems Analysis) (NBS 2014). This study also incorporates the LSMS household income estimates made available by the FAO Rural Income Generating Activities project (FAO 2015).

4.2 Variables

A number of key variables merit explanation. Individuals who had left their initial residence of 2008/09 and consider themselves to have *since* settled in a new community are identified as 'migrants'. This is determined primarily through respondents' 2012/13 self-reports of recent migration, and these are triangulated with survey information on whether the individual had to be tracked to a new location, and with estimates of the distance between 2008/09 and 2012/13 survey locations.[6,7] Individuals who claimed to have recently moved, but were never tracked and did not seem to have travelled more than 5 km from their initial communities, are therefore re-classified as non-migrants in our main analysis. In some cases, individuals had clearly moved some distance but did not consider themselves to be migrants. Because there is some ambiguity around migrant status, robustness checks (section 5.3) are conducted to examine how our results vary with alternate definitions of 'migrant'.

A key component of this analysis is the household classification as 'rural' or 'urban'. The classification that accompanies the LSMS data set is based on the 2002 Population and Household Census, which applied the definition of the National Bureau of Statistics. Accordingly, the following are considered to be 'urban' in Tanzania: (1) all regional and district headquarters, regardless of their size or population density, (2) areas that lie outside the boundaries of these headquarters but possess urban characteristics, such as a predominance of non-agricultural occupations, and (3) areas that are not adjacent to any other urban area but still possess urban characteristics. Urban centers generally have their own markets, schools, and health centers, and the determination of an area as 'urban' is made by a local census committee (Muzzini and Lindeboom 2008).

Our analysis also includes a measure of consumption, where consumption is the annualized monetary value the household spent on, or consumed of, food products within the past week, the amount spent on other commonly-purchased products within the previous month, and the amount spent on less commonly-purchased goods over the past year. These annualized values are weighted with a Fisher food price index specific to geographic stratum and quarter to reflect the cost of living in different settings (NBS 2014), and are scaled to reflect the value of consumption per adult equivalent (AE) per day. Monetary values are adjusted to January 2013 levels using the monthly Consumer Price Index. For reference, key variables are defined in Table A1 in the appendix.

[6] These estimates are derived with the user-written <geodist> command in Stata (created by Robert Picard). They are based on the geographic information made available with the data set, which include community-level coordinates in 2008/09 and household-level coordinates in 2012/13. Hence, very short-distance movements may not be accurately captured.

[7] It seems that enumeration areas changed between survey waves, with new borders sometimes splitting old areas. The enumeration area codes therefore cannot be used to identify out-migrants.

4.3 Identification strategy

To explore our three hypotheses regarding the transmission channels of welfare change, it is not enough to simply compare descriptive statistics of migrants and non-migrants. This is because migrants are likely to be systematically different from non-migrants, in terms of both observed and unobserved characteristics. Lacking experimental data to estimate the effects of migration, we closely follow the method employed by Beegle et al. (2011) to limit self-selection bias. The main equation is:

$$\Delta Y_{ih,2013-2009} = \alpha + \boldsymbol{M_{ih,2013}}\boldsymbol{\beta} + \boldsymbol{X_{ih,2009}}\boldsymbol{\gamma} + \delta_h + \varepsilon_{ih} \quad (3)$$

where the dependent variable is the change in outcome for individual i in initial household h from 2008/09 to 2012/13. This controls for time-invariant unobservable characteristics at the individual level, such as risk preferences or ability, that may influence both the propensity to migrate and an individual's income potential and/or ability to access land or income-generating opportunities. $\boldsymbol{M_{ih,2013}}$ is a vector of migration choices observed in 2012/13, including migration to an urban center, to a less remote rural area, and to an equally (or more) remote rural area, where population density serves as a proxy for remoteness. In this difference-in-differences setup, the estimated effect of a particular type of migration is captured by $\boldsymbol{\beta}$. $\boldsymbol{X_{ih,2009}}$ is a vector of individual characteristics, including age, marital status, and education, and δ_h is an initial household fixed effect (IHHFE) that controls for all household-level characteristics, such as social networks, wealth, and initial livelihood trajectories, that are shared by all household members in 2008/09. ε_{ih} is a stochastic error term. With equation (3), the impact of migration is identified using variation within the initial household, comparing amongst household members that have and have not migrated. While this does not address all sources of unobserved heterogeneity, it does reduce the likely sources of omitted variable bias.

Our main analysis is based on equation (3). However, we also use instrumental variables (IVs) to isolate the exogenous variation in migration decisions, $\boldsymbol{M_{ih,2013}}$, in order to produce unbiased estimates of the effects of migration on consumption. These IVs need to predict individual migration but not affect the *trajectory* of any outcome variable assessed – except through migration. We refer to the literature on migration to select appropriate IVs. Several authors have proposed that geographic characteristics of the place of origin (e.g., distance to large cities) correlate with migration probability but not migrants' welfare or other outcomes at the destination (McKenzie et. al. 2010). A number of papers also find strong correlations between climate variability and subsequent migration (Kubik and Maurel 2016; Munshi 2003; Ocello et al. 2015).

Accordingly, our IVs include indicators for being head, spouse, or son of the household head, and age rank within the household (reflecting a differential propensity to split off from the household), distance from the district headquarters, and a measure of intervening rainfall shocks. Instrumental variable techniques are commonly used with continuous and linear endogenous variables. However, in our case, the decision to migrate is a multinomial (categorical) choice among three possible types of destination. We therefore follow the examples of Deb and Trivedi (2006) and Abreu et al. (2015) by estimating a multinomial treatment effects model, in which the first stage is a mixed multinomial logit (MMNL) model. Assuming that the latent (unobservable) factors that determine destination choice follow a standard normal distribution, the estimation of this model can be carried out using maximum simulated

likelihood (MSL).[8] A full explanation of the model is provided in Appendix B. However, the non-linear first-stage model does not allow for IHHFE, a key component of our identification strategy, and we therefore rely on equation (3) for the main analysis.

5. Results

5.1 Descriptive results

We begin with a broad view of migration flows between rural and urban areas (Table 1). With a focus on the working-age population (ages 15-64), 26% of urban residents and 12% of rural residents had migrated from their 2008/09 community by 2012/13. Not surprisingly, destinations vary by place of origin, with 84% of urban migrants moving to another urban community, and 68% of rural migrants moving to another rural community. These flows over this short four-year period are naturally lower than the stock of migrants in rural areas, where 26% of the working-age population in 2008/09 reported that they had immigrated to their current communities. This figure is higher for women (at 29%) than for men (at 22%).

Table 2 sheds light on the characteristics of migration from rural households, inclusive of all destinations. Migrants move an average of 125 km, and almost half (46%) move to another community within the same district. 22% move to a more densely populated rural area (referred to hereafter as 'less remote'), while a larger share (46%) move to a rural area that is equally or less densely populated than their original community (hereafter referred to as 'more remote'). Migrants are most likely to cite marriage or family reasons as their motivation to migrate (although note that household members that migrated *en masse* for economic reasons may cite their personal motive as family-based). A not insignificant share (24%) move for better services/ housing, while just 6% move for a land-related reason. This suggests that our first hypothesis that migrants benefit from an expansion effect may be inaccurate. In section 5.3, we examine whether our results are robust to a narrower definition of migrant that excludes those who relocated for non-economic reasons.

Table 3 presents descriptive statistics of rural working-age migrants and non-migrants. Migrants are more likely to have been unmarried and female in 2008/09, suggesting that migration is associated with marriage and household formation. A large majority (78%) of migrants are between the ages of 15 and 30, and migrants are more likely to have previously immigrated to their current community. In terms of income-generating activities, migrants are less likely to have engaged in business (self-employment) or wage work in the past year, although this difference is not significant for agricultural wage work. Migrants and non-migrants do not differ significantly in terms of consumption in 2008/09, nor do they differ in terms of their households' stock of livestock, assets, or land area accessed per capita. In other words, they do not seem to come from significantly wealthier (or less wealthy) households. Migrants do come from locations that are more likely to have nutrient-constrained soils, and their households realized lower per-acre crop harvests in 2008/09 and derived a slightly greater share of income from off-farm sources.

We next examine the changes experienced by migrants that have moved to either an urban center, a less remote rural area, or an equally/ more remote rural area by 2012/13 (Table 4), giving particular attention

[8] These estimates are derived with the user-written Stata command <mtreatreg> (created by Partha Deb), using 75 simulation draws.

to the indicators of our hypothesized transmission channels of welfare change. On average, migrants to urban centers see a 68% increase in consumption, which exceeds the boost experienced by migrants to a less remote (28%) or more remote (10%) rural location. Focusing on the indicators of an expansion effect, both urban and less remote rural migrants access significantly less land at their destination, even when this is scaled to the size of their new households or to the number of working-age household members (the land-to-labor ratio). However, migrants to more remote rural locations see, on average, no significant change in land area accessed.

Focusing on the indicators of a productivity effect, we see that migrants to a less remote rural area experience a significant (at the 10% level) improvement in crop productivity per acre, though the same is not true for more remote migrants. (Note that this variable is relevant only for the subset of migrants who cultivated crops at both locations.) More remote migrants also do not find their way to areas of significantly higher agricultural potential, as proxied by an indicator of nutrient-constrained soils. Focusing on the indicators of a diversification effect, the direction and significance of average changes are remarkably similar across destinations. For all three groups, migrants are more likely to be self-employed and to engage in non-agricultural wage work at their destinations. Their households at destination derive a significantly larger share of income from off-farm/ non-farm sources, as compared with their households at origin. And their 2012/13 households are less likely to specialize in agriculture (deriving at least 75% of income from the farm). Even for migrants to more remote locations, this change is significant at the 1% level.

For context, Table 4 also includes characteristics of the community and environment. Migrants to urban centers and more remote rural locales are, on average, moving to lower elevations with higher average temperatures. All groups see an increase in annual rainfall, and all have moved themselves significantly closer to a water source. Migrants to less remote rural areas are not, on average, closer to the district headquarters, suggesting that these are not merely neighborhoods within the main town's sprawl.

5.2 Econometric results

While the descriptive results of section 5.1 reveal intriguing patterns associated with the migration experience, econometric analysis is needed to better determine causality through a focus on intra-household variation. We begin by examining the effect of migration on consumption (Table 5). In column 1, the change in log of consumption (2012/13 minus 2008/09) is a function of individual and household characteristics, while in column 2, household controls are replaced with initial household fixed effects (IHHFE), as per equation (3). These results confirm that migration brings about an improvement in consumption for migrants relative to household members that remained behind, with the greatest effect seen with rural-to-urban migration. However, consistent with the results of Beegle et al. (2011), even moving to a more remote area produces an improvement in consumption. The magnitude of the coefficients in column 2 suggests that the effect of moving to a rural area is under-estimated when not explicitly capturing the intra-household variation, and over-estimated for urban migration.

The first and second stages of the multinomial treatment effects model (columns 3 and 4) are estimated simultaneously. In the first stage, additional IVs are included as regressors in the multinomial logit model of destination choice. Indicators of position within the household (status as head/ spouse or son of the head, and age rank) are significant determinants of migration, with patterns that vary somewhat across

destinations (column 3). An immigrant status in the 2008/09 community and having a spouse reside elsewhere are also significant determinants of migration, and we argue that these should otherwise be exogenous to the trajectory of consumption (particularly as our measure of consumption is based on household-level outcomes). A greater distance from the district headquarters reduces the likelihood of moving to a less remote rural area, although the coefficient is negative for all destinations. Our last IV is a measure of below-normal rainfall between 2009 and 2012 (see Table A1 for a detailed definition), with results weakly suggesting that a negative shock decreases migration to the city. These IVs are jointly significant in the first stage regression (χ^2=98.66, P=0.000). When the latent factors that determine migration choice are accounted for in the second stage model (column 4), results show that migration to all locations produces a significant improvement in consumption, and the magnitude of this effect remains greatest for urban migrants and least for migrants to a more remote rural location. The coefficients for λ provide evidence of a negative selection in unobservables for intra-rural migration, although this is only significant for movement to a less remote area.

Table 6 presents the key coefficients from equation (3) when indicators of our hypothesized pathways of welfare change are treated, in turn, as outcome variables. Results of columns 1 and 2, with negative coefficients on all migrant destinations, provide a fairly definitive rejection our first hypothesis regarding a land expansion effect. (Note, however, that this is a lower bound estimate, as initial households necessarily experience a boost in per capita land access with the departure of a household member.) Results of columns 3 and 4 provide weak evidence (P<0.1) that improved welfare may occur through enhanced land productivity, at least for migrants moving to more densely populated areas. However, the results are underwhelming and do not support our hypothesis of a productivity effect for more remote rural migrants.

Columns 5-13 explore the effect of migration on income diversification. Moving to an urban or more densely populated rural area shifts individuals toward non-agricultural wage work. In columns 8 and 9, we see that migration to both urban and densely populated rural areas results in a greater emphasis on off-farm and, more specifically, non-farm income sources. Migration to a remote location is also significant for the income share derived from off-farm sources, which includes agricultural wage work. Overall, migration means that migrants are less likely to reside in a household that specializes in agricultural production, relative to other initial household members.

Thus far, we've seen limited average effects of migration on agricultural outcomes, and we now explore whether these effects are perhaps heterogeneous. Households are categorized by whether they accessed below-median land area per capita ('small farm') in 2008/09, and whether they achieved below-median net crop revenue per acre ('low crop revenue'). Expanding on equation (3), these indicators are interacted with migration choices in Table 7, which focuses only on the key indicators of an expansion or productivity effect. Results reveal that, although intra-rural migrants hailing from land-constrained households achieve a significantly greater change in land area accessed per capita, relative to other households (column 1), this does not translate into an overall improvement; no land expansion effect is evident. As well, migrants from households with relatively poor agricultural output do not seem to experience a stronger productivity effect, relative to other households.

5.3 Robustness checks

Our results may be sensitive to choices around model selection and how to identify migrants. In this section, we repeat our main analysis with a set of alternative choices. To conserve space, some results are presented in the appendix while others are available upon request. Table A2 in the appendix presents several key coefficients of Tables 6 and 7, using equation (3) throughout, but with alternative definitions of 'migrant'. In the top panel, respondents who self-report that they are *not* immigrants in their 2012/13 communities, but who were tracked in the interim and are either observed to have moved at least 5 km or to reside in another district, are now considered as migrants. This likely bundles together out-migrants and returnees in the migrant category (656 migrant observations). Results are quite consistent with our main analysis, except that migrants to a more remote location are now more likely to specialize in self-employment. In the middle panel, we alternatively define migrants as any individual who has moved at least 5 km between the 2008/09 and 2012/13 interviews, regardless of their self-report (468 migrant observations). Now, migration to a more remote location does not bring a significant improvement in consumption, although the coefficient is similar to our main analysis. In the bottom panel, the migrant label is limited to those who report being motivated to migrate for reasons other than marriage or school (419 migrant observations). Now, intra-rural migrants, regardless of destination, do not experience a significant boost in consumption, though migrants to rural locations more readily engage in non-agricultural wage work.

We also run several key models from Table 6 with a multinomial treatment effects model. Recall that this controls for specific household characteristics, but not IHHFE. Results of this alternative model specification are largely consistent with our main analysis. Migrants to more remote rural areas do not see any significant difference in terms of land access or soil quality, though they are more likely to have found wage work. Finally, the detected boost in consumption that accompanies migration may reflect the way migrants are interviewed later than other initial household members, as they must be tracked to a new location. However, the inclusion of 2012/13 month fixed effects in Table 5 does not affect results.

6. Conclusions

6.1 Summary of results

In this paper, we explore patterns of intra-rural migration in Tanzania and test several hypotheses to explain why such migration generally brings about an improvement in welfare. Specifically, we test whether migration enables migrants to access more land, higher quality land, or off-farm income generating opportunities that may, in turn, translate into greater consumption. This exercise has produced several noteworthy findings. First, the rural population of Tanzania is highly mobile, with 18% of those aged 15-30 moving to a new community within the span of four years. The rate of migration to other rural destinations exceeds the flow to cities (with 68% of rural migrants moving to another rural location), mirroring the pattern seen in other developing countries (Bilsborrow 1998; Lucas 1997 and 2015; Oucho and Gould 1993). It is clear that the flow of migrants from rural households is not characterized by a steady march to the cities, and a narrow focus on rural-to-urban migration would miss much of the story around migration and rural development.

Second, in our main analysis, we do not find evidence that migrants to more remote locations are able, on average, to secure larger landholdings at their destinations. This suggests that migration is not generally used as a pathway to more favorable land access, and thus, we would not expect migration to equilibrate

population densities (and factor ratios) over space. In the face of rising land pressures and declining median land sizes in a number of African countries (Jayne et al. 2003; Jayne et al. 2014; Muyanga and Jayne 2014), our analysis does not indicate that migration is an effective response to this particular challenge. Note, however, that we do not capture region-specific dynamics of migration. In the LSMS data, we note that 41% of working-age migrants that moved to a rural destination between 2008/09 and 2012/13 settled in the Lake Zone in the northwest. Agricultural channels of welfare improvement may be more relevant in certain locations than for intra-rural migrants, on average. With regard to our hypothesis of a productivity effect, we do find weak evidence that migrants to more densely populated rural areas, on average, access more productive land (among those who choose to remain in agriculture). This suggests that more favorable agro-ecological conditions can, indeed, benefit migrants. As land pressures result in more continuous cultivation and increasingly degraded soils (Barrett and Bevin 2015; Titonnell and Giller 2013), it seems migration may enable farmers to achieve a better outcome for themselves – even when they remain agriculturalists.

Third, across all destinations, we find evidence that migrants are fashioning income portfolios of reduced agricultural emphasis. Though the evidence here is weakest for migrants to more remote rural locations, it is the only pathway of welfare change we investigated that seems likely to produce the observed welfare improvement. For migrants to less remote locations, results unequivocally show that they draw more readily from non-agricultural wage work, and rely more heavily on business income and other off-farm wage/salary opportunities. This underscores the importance of the rural nonfarm economy in alleviating poverty, a finding consistent with that reached by other authors (Christiaensen et al. 2013; Christiansen and Todo 2014; Haggblade et al. 2007).

Finally, this paper highlights the relevance of high density rural settlements as a destination for rural migrants. Recall that, by the official definition of 'urban', these sites are not large cities, nor are they regional or even district headquarters, nor are they considered by local census committees to have urban characteristics. Yet moving to higher density areas seems to confer a benefit to rural migrants. Muzzini and Lindeboom (2008) find that approximately 17% of the population in mainland Tanzania reside in high density settlements that are not officially recognized as 'urban'. The authors argue that "significant urbanization many be occurring off the radar screen of government agencies", and that may be what we have keyed into in our analysis of intra-rural migration.

6.2 Directions for further research

This paper exhibits several limitations that should be noted, particularly as future research may aim to address these shortcomings. The relatively short time interval of this study may result in an underestimate of the benefits of migration if returns take longer to accrue. For example, moving to a different agro-ecological context may entail a learning curve before a farmer can achieve higher production. Along the same lines, acquiring land in a new community may require time to build relations and locate a seller. The short time interval also inhibits us from distinguishing between permanent and temporary (circular) migration, although temporary migration is common in developing countries (Lucas 2015), and the dynamics of each type of migration may differ. We are likewise unable to explicitly capture the phenomenon of return migration, which may occur when migrants are unsuccessful at their destinations, or when successful migrants return with capital to invest at home.

By studying the experience of the individual migrant, we overlook the perspective of the sending and receiving households and communities. However, migration may bring negative externalities for non-migrants. For example, sending households may see the departure of their most capable members for greener pastures elsewhere, while households that host guests may initially suffer decreased consumption with more mouths to feed (Garlick et al. 2015). We also acknowledge that our identification strategy, which controls for individual time-constant fixed effects and initial household fixed effects, does not address the characteristics of the migrant's household by 2012/13. In the presence of income pooling, our difference-in-differences approach may not control for all relevant unobservables that influence both migration and income (ibid). Furthermore, there may be alternate avenues through which migration can benefit intra-rural migrants that were not explored here. For example, more secure land rights or better schools in a destination village may also serve as pathways through which migration can bring about improved welfare. The transmission channels examined here are not exhaustive.

6.3 Policy implications

Our results point to several implications for researchers and policy makers. As we find that migration confers a benefit to migrants, consistent with results seen elsewhere (Beegle et al. 2011; de Brauw et al. 2013; Garlick et al. 2015), this suggests that labor mobility is beneficial and should be facilitated, particularly where market failures are inhibitive. Transport and communication infrastructure and the improved provision of education or health services may turn more remote areas into viable destinations (Jayne et al. 2014). Well-functioning land markets may also facilitate intra-rural migration (Wineman and Liverpool-Tasie 2015), as can reliable long-distance real estate brokers and job recruiters. However, policy makers that aim to facilitate intra-rural migration, particularly to more remote areas, ought to weigh the costs of any intervention against the relatively limited benefits observed this this paper.

The positive welfare effects of moving to a less remote rural location demonstrates that intra-rural migration plays an important role in the development process and deserves a place in the discourse on migration. The poverty reducing effects of rural migration seem to derive less from population clustering in megacities and more from migration to other destinations (Christiaensen and Todo 2014; Dorosh and Thurlow 2012), including, as we have shown, growing villages and small towns that do not yet qualify as 'urban'. Although such migration flows are overlooked in the literature on structural transformation (de Brauw et al. 2014), including within efforts to explicitly widen the focus beyond urbanization in megacities (Christiaensen and Todo 2014), even intra-rural migration seems to represent a shift away from agriculture toward other income sources. Our results support the conclusions reached by several others (Christiaensen and Todo 2014; Dorosh and Thurlow 2013) that development strategies ought to encompass both the agricultural and nonfarm rural economy, inclusive of secondary towns.

For policy makers, this suggests that resources, if available, may be directed to rural locations with growing populations in order to encourage intra-rural migration, and to ease the pressure on cities dealing with immigration rates that outstrip job opportunities. Policy makers hold a range of tools that can be used to promote the growth of up-and-coming villages, including the provision of services and incentives for businesses to operate in these sites. For researchers, this paper challenges a common assumption that the only interesting story around migration in developing countries is that between rural areas and already-established cities. Research on migration and structural transformation would benefit from a wider lens.

Appendix B

The multinomial logit treatment effects model

The multinomial logit treatment effects model consists of two stages. The first stage estimates the probability of selecting among several mutually exclusive and exhaustive variables – in our case, the choice of an individual from a rural household to remain at home or relocate to a city, a more densely populated rural area, or a less densely populated rural area. To accommodate this variable structure, the first stage is therefore a multinomial logit model. The second stage estimates the effect of this endogenous multinomial variable on the outcome – in our case, the change in log of consumption between 2008/09 and 2012/13. The second stage is a linear regression, and the two stages are estimated simultaneously with a Maximum Simulated Likelihood (MSL) approach in which the error terms are assumed to be jointly normally distributed (Deb and Trivedi 2006; Abreu et al. 2015).

With regard to the first stage, let j represent a treatment (choice of residence in 2012/13), such that $j = 0,1, \dots J$, and let V_{ij}^* denote the indirect utility for individual i associated with treatment j.

$$V_{ij}^* = \boldsymbol{z_i}\boldsymbol{\alpha_j} + \sum_{k=1}^{J} \delta_{jk} l_{ik} + \eta_{ij} \quad \text{(B1)}$$

V_{ij}^* is a function of $\boldsymbol{z_i}$, a vector of exogenous covariates with associated parameters α_j, and unobserved, latent characteristics, l_{ik}, that are common to the individual's migration strategy and outcome. η_{ij} are i.i.d. error terms, and the latent factors, l_{ik}, are assumed to be independent of η_{ij}.

Although the indirect utility, V_{ij}^*, is not observed, we do observe individual i's choice of migration strategy in the form of a vector $\boldsymbol{d_i} = [d_{io}, d_{i1}, \dots\ d_{iJ}]$. We assume that the probability of selecting a given migration strategy, conditional on the latent factors l_{ik}, has a mixed multinomial logit structure (i.e., a multinomial probability distribution):

$$\Pr(d_i | z_i, l_i) = \frac{\exp(\boldsymbol{z_i}\boldsymbol{\alpha_j} + l_{ij})}{1 + \sum_{k=1}^{J} \exp(\boldsymbol{z_i}\boldsymbol{\alpha_k} + l_{ik})} \quad \text{(B2)}$$

Then, the expected value of our outcome variable is given by:

$$E(y_i | \boldsymbol{d_i}, \boldsymbol{x_i}, \boldsymbol{l_i}) = \boldsymbol{x_i}\boldsymbol{\beta} + \sum_{j=1}^{J} \gamma_j d_{ij} + \sum_{j=1}^{J} \lambda_j l_{ij} \quad \text{(B3)}$$

where y_i is the change in individual i's log of consumption from 2008/09 to 2012/13, $\boldsymbol{x_i}$ is a vector of exogenous covariates with associated parameters $\boldsymbol{\beta}$, and γ_j is a vector of treatment effects relative to the base group that remained at home. Because $E(y_i)$ is a function of the latent factors l_{ij}, the outcome is affected by the unobserved characteristics (e.g., ambition or capability) that also affect selection into the treatment.

According to Deb and Trivedi (2006), identification of this model requires that restrictions be set at $\delta_{jk} = 0$ for all $j \neq k$, meaning that each migration choice is affected by a *unique* latent factor. For the model to be identified, it is not strictly necessary for vector $\boldsymbol{z_i}$ to include additional variables relative to $\boldsymbol{x_i}$. However, we include several exclusion restrictions where we believe a variable is likely to affect the propensity to migrate to various destinations, but unlikely to affect the subsequent trajectory of consumption.

References

Abreu, M., A. Faggian, and P. McCann. 2014. Migration and inter-industry mobility of UK graduates. *Journal of Economic Geography*, 15: 353-385.

Baland, J. M., F. Gaspart, J. P. Platteau, and F. Place. 2007. The distributive impact of land markets in Uganda. *Economic Development and Cultural Change,* 55: 283-311.

Barrett, C. B., and L. Bevis. 2015. The self-reinforcing feedback between low soil fertility and chronic poverty. *Nature Geoscience*, 8: 907-912.

Bazzi, S., A. Gaduh, A. Rothenberg, and M. Wong. 2014. Skill transferability, migration, and development: Evidence from population resettlement in Indonesia. The Bureau for Research and Economic Analysis of Development. Working Paper No. 469. Accessed at http://ibread.org/bread/system/files/bread_wpapers/469.pdf.

Beegle, K., J. de Weerdt, and S. Dercon. 2011. Migration and economic mobility in Tanzania: Evidence from a tracking survey. *The Review of Economics and Statistics,* 93 (3): 1010-1033.

Bilsborrow, R. E. 1998. The State of the Art and Overview of the Chapters. In Bilsborrow, R. E. (Ed.) *Migration, Urbanization, and Development: New Directions and Issues*. Norwell, MA, Kluwer Academic Publishers.

Christiaensen, L., and Y. Todo. 2014. Poverty reduction during the rural–urban transformation – The role of the missing middle. *World Development*, 63: 43-58.

Christiaensen, L., J. de Weerdt, and Y. Todo. 2013. Urbanization and poverty reduction: The role of rural diversification and secondary towns. *Agricultural Economics*, 44: 435-447.

de Brauw, A., V. Mueller, and T. Woldehanna. 2013. Does internal migration improve overall well-being in Ethiopia? Ethiopia Strategy Support Program Working Paper No. 55. Washington, D.C.: International Food Policy Research Institute.

de Bruijn, M., and H. van Dijk. 2003. Changing population mobility in West Africa: Fulbe pastoralists in Central and South Mali. *African Affairs,* 102 (407): 285-307.

de Haan, A. 1999. Livelihoods and poverty: The role of migration - a critical review of the migration literature. *The Journal of Development Studies*, 36 (2): 1-47.

Deb, P. and Trivedi, P. 2006. Specification and simulated likelihood estimation of a non-normal treatment-outcome model with selection: application to health care utilization. *Econometrics Journal*, 9 (2), 307 – 331.

Dorosh, P., and J. Thurlow. 2014. Can cities or towns drive African development? Economywide analysis for Ethiopia and Uganda. *World Development*, 63: 113-123.

Food and Agriculture Organization of the United Nations FAO. 2015. Rural Income Generating Activities (RIGA) database. Accessed at www.fao.org/economic/riga/riga-database/en/.

Haggblade, S., P. Hazell, and T. Reardon. 2007. *Transforming the Rural Nonfarm Economy – Opportunities and Threats in the Developing World*. Baltimore: John Hopkins University Press.

Hampshire, K., and S. Randall. 1999. Seasonal labor migration strategies in the Sahel: Coping with poverty or optimizing security? *International Journal of Population Geography,* 5: 367-85.

Harris, J., and M. Todaro. 1970. Migration, unemployment and development: A two-sector analysis. *American Economic Review,* 60 (1): 126–142.

Hirvonen, K., and H. Lilleør. 2015. Going back home: Internal return migration in rural Tanzania. *World Development*, 70: 186-202.

Jayne, T. S., and M. Muyanga. 2012. Land constraints in Kenya's densely populated rural areas: Implications for food policy and institutional reform. *Food Security*, 4 (3): 399–421.

Jayne, T. S., T. Yamano, M. Weber, D. Tschirley, R. Benfica, A. Chapoto, and B. Zulu. 2003. Smallholder income and land distribution in Africa: implications for poverty reduction strategies. *Food Policy,* 28 (3): 253–275.

Jayne, T. S., J. Chamberlin, and D. Headey. 2014. Land pressures, the evolution of farming systems, and development strategies in Africa: A synthesis. *Food Policy,* 48: 1-17.

Kubik, Z., and M. Maurel. 2016. Weather shocks, agricultural production and migration: Evidence from Tanzania. *Journal of Development Studies*, 52 (5): 665-680.

Lewis, W. A. 1954. Economic development with unlimited supplies of labour. *The Manchester School*, 22(2): 139-91.

Lucas, R. 1997. Internal migration in developing countries. In M. Rozenweig and O. Stark (eds.) *The Handbook of Population and Family Economics.* Amsterdam: Elsevier, pp. 721–798.

Lucas, R. 2015. Internal migration in developing economies: An overview. Working Paper No. 6. Washington, DC: Global Knowledge Partnership on Migration and Development (KNOMAD).

McKenzie, D., S. Stillman, and J. Gibson. 2010. How important is selection: Experimental vs. non-experimental measures of the income gains from migration. *Journal of the European Economic Association,* 8 (4): 913–945.

Munshi, K. 2003. Networks in the modern economy: Mexican migrants in the United States labor market, *Quarterly Journal of Economics*, 118 (2): 549-597.

Muyanga, M., and T. S. Jayne. 2014. Effects of rising rural population density on smallholder agriculture in Kenya. *Food Policy*, 48: 98-113.

Muzzini, E., and W. Lindeboom. 2008. The Urban Transition in Tanzania: Building the Empirical Base for Policy Dialogue. Washington DC: World Bank.

National Bureau of Statistics (NBS). 2014. Basic Information Document, National Panel Survey 2012-13. Dar es Salaam: NBS.

Ocello, C., A. Petrucci, M. R. Tests, and D. Vignoli. 2015. Environmental aspects of internal migration in Tanzania. *Population and Environment*, 37: 99-108.

Oucho, J. O., and W. T. S. Gould. 1993. Migration, urbanization and population distribution. In K. A. Foote, K. K. Hill and L. G. Martin (eds.) Demographic Change in Sub-Saharan Africa. Washington, DC: National Academy Press, pp. 256–296.

Potts, D. 2006. Rural mobility as a response to land shortages: The case of Malawi. *Population, Space and Place* 12: 291-311.

Sjaastad, L. 1962. The costs and returns of human migration. *Journal of Political Economy*, 70 (5): 80–93.

Skeldon, R. 1986. On migration patterns in India during the 1970s. *Population and Development Review,* 12 (4): 759-779.

Tittonell, P., and K. Giller. 2012. When yield gaps are poverty traps: The paradigm of ecological intensification in African smallholder agriculture. *Field Crops Research*, 143 (1): 76–90.

Wineman, A., and L. S. Liverpool-Tasie. 2015. Land markets and migration trends in Tanzania: A qualitative-quantitative analysis. *Mimeo*, Michigan State University: East Lansing.

Wineman, A., and L. S. Liverpool-Tasie. 2016. Land markets and equity of land distribution in northwestern Tanzania. Selected presentation at the Agricultural and Applied Economics Association Annual Meeting, August 1-3, Boston, MA.

Wooldridge, J. 2002. *Econometric Analysis of Cross Section and Panel Data*. Cambridge, MA: Massachusetts Institute of Technology Press.

World Bank. 2015. Tanzania Mainland Poverty Assessment: Main Report. Washington, DC: World Bank.

Tables

Table 1. Prevalence of migration among working-age population, 2008/09 – 2012/13

Residence in 2008/09	Status in 2012/13: Remained in same location	Migrated to rural location	Migrated to urban location
Urban N=2,815 representing 4.90 million	**75.91%** 3.72 million	**4.42%** 0.22 million	**19.67%** 0.96 million
Rural N=4,844 representing 13.56 million	**88.10%** 11.95 million	**8.15%** 1.11 million	**3.76%** 0.51 million

Table 2. Characteristics of migration among working-age rural migrants, 2008/09 – 2012/13

	Mean	SD
Distance moved (km)	125.42	(207.84)
1= Moved to new region	0.34	(0.47)
1= Moved to new district in same region	0.20	(0.40)
1= Moved within the same district	0.46	(0.50)
1= Moved to an urban center	0.32	(0.46)
1= Moved to a less remote rural location	0.22	(0.42)
1= Moved to an equally or more remote rural location	0.46	(0.50)
1= At least one working-age HH member remained at home	0.84	(0.36)
Reasons for migration		
1= Moved for work	0.09	(0.29)
1= Moved for school	0.01	(0.11)
1= Moved for marriage	0.26	(0.44)
1= Moved for other family reasons	0.27	(0.44)
1= Moved for services/ housing	0.24	(0.43)
1= Moved for land	0.06	(0.24)
1= Moved for any other reason	0.06	(0.23)
Observations	539	

Table 3. Descriptive statistics of migrants and non-migrants from rural HHs, 2008/09 – 2012/13

	(1) Migrants		(2) Non-migrants		Test
Individual characteristics (2008/09)	Mean	SD	Mean	SD	(1) = (2)
1= Married male	0.11	(0.31)	0.25	(0.43)	***
1= Unmarried male	0.26	(0.44)	0.25	(0.43)	
1= Married female	0.23	(0.42)	0.30	(0.46)	***
1= Unmarried female	0.41	(0.49)	0.21	(0.40)	***
1= Age 15-30	0.78	(0.41)	0.49	(0.50)	***
1= Age 30-45	0.20	(0.40)	0.33	(0.47)	***
1= Age 45-64	0.07	(0.25)	0.23	(0.42)	***
1= Individual has completed primary school	0.17	(0.37)	0.10	(0.30)	***
1= Individual has completed Form 10	0.04	(0.20)	0.02	(0.15)	*
1= Head or spouse	0.34	(0.48)	0.63	(0.48)	***
1= Son of HH head	0.15	(0.36)	0.18	(0.38)	
Age rank in HH	5.17	(3.42)	5.26	(3.14)	
1= Has spouse elsewhere	0.04	(0.21)	0.06	(0.23)	
1= Has immigrated to current community	0.31	(0.46)	0.25	(0.43)	**
1= Has been self-employed (past year)	0.10	(0.31)	0.14	(0.35)	**
1= Has done non-agricultural wage work	0.05	(0.22)	0.08	(0.27)	**
1= Has done agricultural wage work	0.09	(0.29)	0.10	(0.31)	
Characteristics of individual's household (HH) (2008/09)					
Consumption per AE per day (ln of TSh/ AE/ day)	7.49	(0.57)	7.48	(0.55)	
HH size	7.33	(4.32)	6.73	(3.83)	***
Proportion dependents	0.43	(0.20)	0.45	(0.20)	**
Age of HH head	46.95	(14.20)	46.91	(13.77)	
1= Female-headed household	0.23	(0.42)	0.18	(0.38)	**
1= Migrant HH head	0.33	(0.47)	0.25	(0.43)	***
1= Someone in HH has completed primary school	0.31	(0.46)	0.28	(0.45)	**
1= HH experienced recent working-age death	0.07	(0.25)	0.06	(0.24)	
TLU	4.89	(18.86)	3.84	(14.35)	
Asset index	0.81	(3.26)	0.65	(2.90)	
Land accessed per capita (acres)	1.05	(1.62)	1.10	(1.89)	
Land accessed per working-age HH member (acres)	1.99	(3.42)	2.15	(3.22)	
Net value crop harvest per acre (100,000s TSh)[a]	1.02	(1.13)	1.21	(2.58)	**
1= Soil not severely nutrient-constrained	0.77	(0.42)	0.83	(0.37)	***
Share HH income from off-farm sources	0.35	(0.34)	0.32	(0.34)	*
Share HH income from non-farm sources	0.22	(0.31)	0.20	(0.30)	
1= HH specializes in agriculture (≥ 75% of income)	0.52	(0.50)	0.55	(0.50)	
1= HH specializes in self-employment	0.04	(0.20)	0.05	(0.21)	
1= HH specializes in non-agricultural wage work	0.01	(0.07)	0.01	(0.08)	
1= HH specializes in agricultural wage work	0.03	(0.18)	0.03	(0.16)	
Population density (persons/km^2)	258.84	(305.34)	292.47	(459.75)	
Distance to district headquarters (km)	34.93	(31.11)	37.17	(45.27)	
Elevation (m)	1,076.29	(442.84)	1,066.67	(483.89)	
Annual avg. temperature (10s °C)	841.30	(239.01)	811.30	(233.75)	**
Annual avg. rainfall (mm)	224.02	(21.60)	221.42	(23.82)	**
Greatest negative rainfall shock (2009-2012)	0.17	(0.12)	0.19	(0.12)	**
Observations	539		4,203		

Note: All statistics are limited to the working-age (15-64) population. Asterisks connote significance level for a t-test of equality; *** p<0.01, ** p<0.05, * p<0.1.

[a] Relevant only for households with crop income (N = 4,223).

Table 4. Changes associated with migration from rural households, 2008/09 – 2012/13

	(1) Migrated to urban center		(2) Migrated to *less* remote rural location		(3) Migrated to *more* remote rural location	
Variable (2012/13 minus 2008/09 values)	Mean Δ	SD	Mean Δ	SD	Mean Δ	SD
Consumption per AE per day (ln)	0.682***	(0.628)	0.276***	(0.698)	0.095*	(0.762)
Land accessed per capita (acres)	-0.377***	(1.334)	-0.288*	(1.400)	0.024	(3.109)
Land accessed per working-age HH member (acres)	-0.559***	(2.763)	-0.541**	(2.405)	-0.146	(5.013)
Net value crop/tree crop harvest per acre (100,000s TSh)[a]	0.649	(3.634)	0.505*	(2.018)	0.155	(4.377)
1= Soil not severely nutrient-constrained	0.111***	(0.479)	0.134***	(0.459)	0.008	(0.272)
1= Has been self-employed in past year	0.151***	(0.464)	0.150***	(0.494)	0.074**	(0.481)
1= Has done non-agricultural wage work in past year	0.288***	(0.481)	0.158***	(0.434)	0.104***	(0.400)
1= Has done agricultural wage work in past year	0.024	(0.314)	0.127**	(0.569)	0.116***	(0.489)
Share HH income from off-farm sources	0.496***	(0.393)	0.324***	(0.477)	0.146***	(0.441)
Share HH income from non-farm sources	0.472***	(0.433)	0.194***	(0.473)	0.102***	(0.374)
1= HH specializes in agriculture (>= 75% of income)	-0.410***	(0.542)	-0.370***	(0.623)	-0.157***	(0.613)
1= HH specializes in self-employment	0.185***	(0.439)	0.121**	(0.437)	0.041**	(0.311)
1= HH specializes in non-agricultural wage work	0.338***	(0.531)	0.054*	(0.302)	0.076***	(0.284)
1= HH specializes in agricultural wage work	0.009	(0.167)	0.066**	(0.249)	0.016	(0.161)
Population density (persons/km^2)	5,422.211***	(7,132.753)	488.836***	(1,007.612)	-194.009***	(288.179)
Elevation (m)	-292.180***	(579.883)	3.851	(265.093)	-53.961***	(270.329)
Annual avg. rainfall (mm)	214.592***	(285.515)	135.736***	(211.748)	164.283***	(241.338)
Annual avg. temperature (10s °C)	11.527***	(27.027)	-1.645	(12.832)	1.937**	(13.676)
Distance to district headquarters (km)	-21.077***	(41.371)	-0.477	(28.450)	3.287**	(23.928)
Time to water source in dry season (min)	-33.267***	(79.637)	-23.869**	(97.827)	-28.981***	(92.417)
Observations	183		106		250	

Note: Asterisks reflect the results of a Wald test of the null hypothesis that the mean change equals zero; *** p<0.01, ** p<0.05, * p<0.1.

[a] Only applicable if individual resided in a cropping household in both 2008/09 and 2012/13. Number of observations: urban (43), less remote rural (60), more remote rural (165).

Table 5. Effect of migration from rural households on consumption

	(1)	(2)	(3)			(4)
	DID	DID-IHHFE	First-stage multinomial logit			MSL
	Δ consumption (ln)	Δ consumption (ln)	1=Moved to city	1=Moved to less remote rural area	1=Moved to more remote rural area	Δ consumption (ln)
1= Moved to city	0.685***	0.617***				0.661***
	(0.000)	(0.000)				(0.000)
1= Moved to less remote rural area	0.292***	0.309***				0.497***
	(0.000)	(0.010)				(0.001)
1= Moved to more remote rural area	0.120**	0.164**				0.263**
	(0.045)	(0.044)				(0.029)
1= Married male	-0.035	0.006	-0.572	-0.834*	-0.060	-0.034
	(0.302)	(0.877)	(0.234)	(0.080)	(0.885)	(0.314)
1= Married female	-0.059*	-0.013	-0.221	-0.026	0.345	-0.061**
	(0.055)	(0.698)	(0.598)	(0.951)	(0.366)	(0.044)
1= Unmarried female	-0.020	0.020	0.488	-0.220	0.973***	-0.032
	(0.472)	(0.450)	(0.165)	(0.552)	(0.002)	(0.258)
1= Age 15-30	0.014	0.019	1.584***	0.684	1.585***	0.002
	(0.775)	(0.594)	(0.009)	(0.265)	(0.000)	(0.975)
1= Age 30-45	-0.019	-0.034	0.311	0.411	0.650*	-0.026
	(0.661)	(0.292)	(0.585)	(0.472)	(0.071)	(0.560)
1= Age 45-64	0.017	-0.006	-0.157	-0.808	0.110	0.018
	(0.719)	(0.874)	(0.829)	(0.305)	(0.822)	(0.719)
1= Individual has completed primary school	0.012	0.022	0.641*	-0.241	-0.167	0.016
	(0.750)	(0.532)	(0.062)	(0.678)	(0.633)	(0.657)
1= Individual has completed Form 10	0.009	0.072	0.951**	0.467	0.069	0.005
	(0.892)	(0.217)	(0.022)	(0.607)	(0.924)	(0.944)
HH size	0.021***		0.015	-0.236**	-0.045	0.021***
	(0.003)		(0.881)	(0.049)	(0.453)	(0.004)
Proportion dependents	-0.097		-0.780	-0.431	-1.181**	-0.090
	(0.287)		(0.291)	(0.604)	(0.049)	(0.320)
Age of HH head	0.000		-0.011	-0.023**	-0.002	0.000
	(0.761)		(0.247)	(0.044)	(0.751)	(0.737)

1= Female-headed household	0.016	0.586*	-0.378	-0.164	0.019
	(0.699)	(0.073)	(0.320)	(0.523)	(0.642)
1= Migrant HH head	0.041	-0.002	0.383	0.058	0.036
	(0.301)	(0.994)	(0.296)	(0.810)	(0.366)
1= HH member completed primary school	0.043	-0.168	0.162	-0.279	0.043
	(0.349)	(0.680)	(0.693)	(0.295)	(0.350)
1= HH experienced recent death	-0.193***	-0.082	-0.249	-0.196	-0.191***
	(0.001)	(0.858)	(0.642)	(0.627)	(0.001)
TLU	-0.002	-0.048	0.005	0.006	-0.002
	(0.323)	(0.122)	(0.458)	(0.401)	(0.291)
Asset index	-0.014**	0.110**	-0.148**	-0.102**	-0.012*
	(0.032)	(0.015)	(0.017)	(0.030)	(0.059)
Land accessed per capita (acres)	-0.017	-0.116	0.021	0.047	-0.017
	(0.127)	(0.336)	(0.809)	(0.291)	(0.121)
Population density (persons/km2)	0.000	-0.000**	-0.003***	0.000*	0.000
	(0.504)	(0.038)	(0.000)	(0.097)	(0.485)
Annual avg. rainfall (mm)	0.000**	-0.001	0.002***	0.000	0.000**
	(0.014)	(0.296)	(0.001)	(0.575)	(0.019)
Annual avg. temperature (10s C)	0.000	0.007	0.017**	0.022***	0.000
	(0.741)	(0.512)	(0.024)	(0.002)	(0.902)
Elevation (m)	-0.000	-0.000	0.001**	0.001***	-0.000*
	(0.106)	(0.774)	(0.027)	(0.002)	(0.072)
1= Head or spouse		-1.031***	-2.155***	-1.024***	
		(0.008)	(0.000)	(0.001)	
1= Son of HH head		-0.625	-1.426***	-0.886**	
		(0.103)	(0.001)	(0.013)	
Age rank in HH		0.005	0.320**	0.107	
		(0.964)	(0.021)	(0.138)	
1= Has spouse elsewhere		1.124*	0.317	0.687*	
		(0.055)	(0.569)	(0.076)	
1= Has not always lived in current location		0.230	0.750**	0.742***	
		(0.408)	(0.026)	(0.000)	
Distance to district headquarters (km)		-0.000	-0.009**	-0.003	
		(0.958)	(0.022)	(0.356)	

Greatest negative rainfall shock (2009-12)			-1.841	1.458	-1.562	
			(0.109)	(0.364)	(0.169)	
Initial household fixed effects (IHHFE)		Y				
Constant	-0.251	-0.048	-4.194	-7.917***	-9.747***	-0.180
	(0.445)	(0.238)	(0.155)	(0.002)	(0.000)	(0.587)
λ(Moved to city)						0.025
						(0.845)
λ(Moved to less remote rural area)						-0.233*
						(0.096)
λ(Moved to more remote rural area)						-0.163
						(0.185)
Observations	4,742	4,742	4,742	4,742	4,742	4,742
Adjusted R-squared	0.080	0.786				

P-values in parentheses; standard errors clustered at HH level; *** p<0.01, ** p<0.05, * p<0.1

Table 6. Effects of migration from rural households on various indicators of welfare transmission channels

	(1) △ HH land per capita (acres)	(2) △ HH land per working-age HH member (acres)	(3) △ Net value crop harvest per acre	(4) △ 1= Soil not severely nutrient-constrained	(5) △ 1= Individual is self-employed	(6) △ 1= Individual is a non-agricultural wage worker	(7) △ 1= Individual is an agricultural wage worker
1= Individual migrated to **urban** destination	-0.738***	-1.361***	0.577	0.117	0.028	0.255***	-0.040
	(0.001)	(0.001)	(0.580)	(0.125)	(0.683)	(0.001)	(0.355)
1= Individual migrated to **less remote rural** destination	-1.017*	-2.249*	0.718*	0.138*	0.061	0.140*	-0.001
	(0.088)	(0.057)	(0.078)	(0.062)	(0.467)	(0.070)	(0.993)
1= Individual migrated to **more remote rural** destination	-0.116	-0.386	0.222	-0.002	0.051	0.073	0.076
	(0.767)	(0.451)	(0.682)	(0.951)	(0.429)	(0.168)	(0.138)
P > F (Urban = Less remote rural)							
P > F (Less = More remote rural)				0.072			
Obs.	4,742	4,742	3,594	4,742	4,742	4,742	4,742

	(8) △ Share HH income from off-farm sources	(9) △ Share HH income from non-farm sources	(10) △ 1= HH specializes in agriculture	(11) △ 1= HH specializes in self-employment	(12) △ 1= HH specializes in non-agricultural wage work	(13) △ 1= HH specializes in agricultural wage work
1= Individual migrated to **urban** destination	0.361***	0.384***	-0.279***	0.086	0.323***	0.025
	(0.000)	(0.000)	(0.000)	(0.238)	(0.000)	(0.286)
1= Individual migrated to **less remote rural** destination	0.320***	0.228***	-0.335***	0.164**	0.057	0.042
	(0.000)	(0.005)	(0.000)	(0.022)	(0.342)	(0.200)
1= Individual migrated to **more remote rural** destination	0.080*	0.059	-0.054	0.056	0.032	0.011
	(0.089)	(0.213)	(0.379)	(0.103)	(0.441)	(0.385)
P > F (Urban = Less remote rural)					0.004	
P > F (Less = More remote rural)	0.003	0.059	0.004			
Obs.	4,742	4,742	4,742	4,742	4,742	4,742

P-values in parentheses; standard errors clustered at household level; *** p<0.01, ** p<0.05, * p<0.1
Individual controls and IHHFE are included in all regressions.
Tests for significant difference between coefficients reported if P < 0.1.

Table 7. Effects of migration on agricultural outcomes, by 2008/09 agricultural characteristics

	(1) △ HH land per capita (acres)	(2) △ HH land per working-age HH member (acres)	(3) △ Net value crop harvest per acre
1= Individual migrated to **urban** destination	-1.241**	-1.798*	2.073
	(0.030)	(0.083)	(0.265)
1= Individual migrated to **less remote rural** destination	-2.351*	-5.119*	1.233*
	(0.095)	(0.067)	(0.051)
1= Individual migrated to **more remote rural** destination	-0.889*	-1.353*	0.566
	(0.073)	(0.091)	(0.511)
Migrated to **urban** * Small farm	0.809	0.732	
	(0.167)	(0.491)	
Migrated to **less remote rural** * Small farm	2.187	4.695*	
	(0.120)	(0.090)	
Migrated to **more remote rural** * Small farm	1.576**	1.940*	
	(0.035)	(0.055)	
Migrated to **urban** * Low crop revenue			-2.711
			(0.179)
Migrated to **less remote rural** * Low crop revenue			-1.127
			(0.115)
Migrated to **more remote rural** * Low crop revenue			-0.825
			(0.340)
β[Migrated to **less remote rural**] + β[Migrated to **less remote rural** * Small farm]	-0.164	-0.424	
	(0.427)	(0.141)	
β[Migrated to **more remote rural**] + β[Migrated to **more remote rural** * Small farm]	0.687	0.587	
	(0.224)	(0.335)	
Observations	4,742	4,742	3,594

P-values in parentheses; standard errors clustered at household level; *** p<0.01, ** p<0.05, * p<0.1
Individual controls and IHHFE are included in all regressions.

Table A1. Definitions of key variables

Variable	Definition
Urban	1= An area that is either (a) a regional or district headquarters, (b) adjacent to headquarters, and possessing urban characteristics, or (c) not adjacent to any other urban center, but possessing urban characteristics
More remote rural location	1= A location of equal or lower population density than an individual's 2008/09 community
Migrant	1= Individual meets the following criteria: (a) Reported in 2012/13 that s/he had immigrated to current community within the previous four years, and (b) was tracked by survey implementers to a new location, or (c) moved at least 5 km, as estimated by survey coordinates
Consumption per AE per day [a]	[(Annualized monetary value (TSh) of consumption of food and other items)/ adult equivalents (weighted by time spent at home)/ 365] The estimate of consumption excludes expenditures on tobacco, alcohol, health care, and weddings/ funerals. The value is adjusted with a Fisher food price index specific to quarter and geographic stratum to reflect the cost of living in different settings.
Land accessed (acres)	Agricultural land area that a household either owns or rents/ borrows
Net value crop harvest per acre (100,000s TSh)	[(Gross value of crop harvest, including field and tree crops, over previous main and short seasons – expenditures on inputs, labor, and equipment rental)/ Total land area under crop (summing over the two seasons)]
Soil not severely nutrient-constrained	1= Soil is not estimated to face severe nutrient constraints, based on a scale of three (not constrained, moderately constrained, and severely constrained)
Share HH income from off-farm sources	Proportion of household net income that is derived from sources other than own-farm and own-livestock production (from FAO (2015))
Share HH income from non-farm sources	Proportion of household net income that is derived from sources other than agricultural wage work, own-farm, and own-livestock production. Note that this is a subset of off-farm income sources.
HH specializes in agriculture	1= Household derives at least 75% of income from agriculture (from FAO (2015))
Greatest negative rainfall shock (2009-2012)	The magnitude of the greatest below-average rainfall shock over the years 2009-2012, where rainfall shock is defined as the proportion rainfall in the wettest quarter below the long-term average for this quarter.
HH experienced recent death	1= The household has experienced the death of a working-age member within the previous two years
TLU	Index of tropical livestock units owned, using the conversion factors of HarvestPlus.
Asset index	Index of non-livestock physical assets and residence characteristics (e.g., number of rooms) constructed with principal component analysis, specific to the rural sector. The mean value is zero for rural households, with higher values indicating greater wealth. However, at the individual level, the mean value deviates from zero.

[a] Note: We intend to re-create this variable, though the current draft uses the consumption index that accompanied the data set.

Table A2. Effects of migration from rural households, with alternative definitions of migrant

Migrant = Self-report + individual was tracked + shifted 5 km or to another district	(1) △ consumption (ln)	(2) △ HH land per capita (acres)	(3) △ 1= Soil not severely nutrient-constrained	(4) △ 1= Individual is a non-agricultural wage worker	(5) △ Share HH income from off-farm sources	(6) △ 1= HH specializes in agriculture	(7) △ 1= HH specializes in self-employment
1= Individual migrated to **urban** destination	0.609***	-0.798***	0.127*	0.261***	0.363***	-0.286***	0.086
	(0.000)	(0.000)	(0.072)	(0.000)	(0.000)	(0.000)	(0.225)
1= Individual migrated to **less remote rural** destination	0.272**	-1.202	0.105*	0.121*	0.282***	-0.300***	0.131**
	(0.012)	(0.183)	(0.088)	(0.063)	(0.000)	(0.000)	(0.037)
1= Individual migrated to **more remote rural** destination	0.144*	-0.151	0.006	0.073	0.093**	-0.066	0.085**
	(0.054)	(0.644)	(0.835)	(0.116)	(0.031)	(0.233)	(0.018)
P > F (Urban = Less remote rural)	0.012						
P > F (Less = More remote rural)					0.009	0.007	
Obs.	4,742	4,742	4,742	4,742	4,742	4,742	4,742

Migrant = Individual shifted at least 5 km	(1) △ consumption (ln)	(2) △ HH land per capita (acres)	(3) △ 1= Soil not severely nutrient-constrained	(4) △ 1= Individual is a non-agricultural wage worker	(5) △ Share HH income from off-farm sources	(6) △ 1= HH specializes in agriculture	(7) △ 1= HH specializes in self-employment
1= Individual migrated to **urban** destination	0.605***	-0.800***	0.119*	0.227***	0.344***	-0.272***	0.085
	(0.000)	(0.001)	(0.066)	(0.003)	(0.000)	(0.000)	(0.208)
1= Individual migrated to **less remote rural** destination	0.279**	-1.502	0.085	0.119	0.218***	-0.217**	0.093
	(0.032)	(0.251)	(0.285)	(0.157)	(0.007)	(0.019)	(0.230)
1= Individual migrated to **more remote rural** destination	0.130	0.059	0.022	0.077	0.126**	-0.130*	0.068
	(0.177)	(0.907)	(0.563)	(0.112)	(0.019)	(0.057)	(0.119)
P > F (Urban = Less remote rural)	0.038						
P > F (Less = More remote rural)							
Obs.	4,742	4,742	4,742	4,742	4,742	4,742	4,742

Migrant = Self-report + individual shifted for a reason *other than* marriage or school	(1) △ consumption (ln)	(2) △ HH land per capita (acres)	(3) △ 1= Soil not severely nutrient-constrained	(4) △ 1= Individual is a non-agricultural wage worker	(5) △ Share HH income from off-farm sources	(6) △ 1= HH specializes in agriculture	(7) △ 1= HH specializes in self-employment
1= Individual migrated to **urban** destination	0.583***	-0.725***	0.060	0.330***	0.296***	-0.197***	0.076
	(0.000)	(0.001)	(0.466)	(0.000)	(0.000)	(0.001)	(0.362)
1= Individual migrated to **less remote rural** destination	0.255	-0.776**	0.087	0.192*	0.338***	-0.355***	0.161
	(0.144)	(0.032)	(0.277)	(0.058)	(0.000)	(0.000)	(0.104)
1= Individual migrated to **more remote rural** destination	0.101	-0.064	-0.002	0.127**	0.084	-0.055	0.005
	(0.282)	(0.891)	(0.968)	(0.050)	(0.108)	(0.404)	(0.906)
P > F (Urban = Less remote rural)	0.099						
P > F (Less = More remote rural)					0.013	0.008	
Obs.	4,742	4,742	4,742	4,742	4,742	4,742	4,742

P-values in parentheses; standard errors clustered at household level; *** p<0.01, ** p<0.05, * p<0.1
Individual controls and initial household fixed effects (IHHFE) are included in all regressions.
Results of tests for significant difference between coefficients reported if P < 0.1.