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**Boda Bodas Rule: Non-agricultural Activities and  
Their Inequality Implications in Western Kenya**

by

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# **Boda-bodas\* Rule: Non-agricultural Activities and Their Inequality Implications in Western Kenya**

Jann Lay, George Michuki M'Mukaria, Toman Omar Mahmoud

Abstract:

Engagement in non-agricultural activities in rural areas can be classified into survival-led or opportunity-led. Survival-led diversification would decrease inequality by increasing the incomes of poorer households and thus reduce poverty. By contrast, opportunity-led diversification would increase inequality and have a minor effect on poverty, as it tends to be confined to non-poor households. Using data from Western Kenya, we confirm the existence of the differently motivated diversification strategies. Yet, the poverty and inequality implications differ somewhat from our expectations. Our findings indicate that in addition to asset constraints, rural households also face limited or relatively risky high-return opportunities outside agriculture.

**Keywords:** Income diversification, non-agricultural activities, inequality, poverty, sub-Saharan Africa, Kenya

**JEL:** Q12, O17, I31

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\* Boda-boda – originally a bicycle taxi in East Africa (from English border-border). The bicycle rider can also be called boda-boda.

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## Introduction

A number of studies have shown that rural households in sub-Saharan Africa derive their incomes from a variety of sources with non-agricultural activities accounting for a substantial share of total income.<sup>1</sup> Despite the importance of non-agricultural activities for rural farm households, we still know little about the impact of such activities on the distribution of income and, hence, on poverty.

There are several reasons that have been advanced for income diversification among households who were traditionally exclusively engaged in farming activities. Broadly, one may classify diversification strategies as survival-led or opportunity-led. It has been observed that poor rural households with low asset endowments embrace multiple livelihoods, in particular engagement in non-agricultural activities, to ensure survival. These households are forced to diversify mainly because they lack sufficient agricultural assets to sustain subsistence (Reardon and Taylor 1996; Haggblade et al. 2005). Returns to these activities may well be below those in agriculture. At the same time, richer rural households with higher asset endowments will choose to diversify their livelihoods to maximise returns to their assets. Such activities will have at least the same returns as agricultural activities and exhibit entry barriers that the poor are not able to overcome.

The existence of these two types of non-agricultural activities implies a U-shaped relationship between the share of income derived from non-agricultural activities and household wealth as well as household income. The poverty and distributional impact of non-agricultural incomes should hence be ambiguous: Survival-led engagement in non-agricultural activities should be inequality-decreasing through increasing the incomes of the poorer parts of the population and hence reduce poverty. Opportunity-led diversification, however, should increase inequality and have a minor effect on poverty, as it may be confined to non-poor households. Some authors have pointed to this ambiguity (e.g. Ferreira and Lanjouw 2001; Haggblade et al. 2005), but only few, e.g. Elbers and Lanjouw (2001) for rural Ecuador, explicitly address the relationship between different diversification strategies, on the one hand, and poverty and distributional outcomes, on the other.

This paper intends to fill this gap by providing evidence from sub-Sahara Africa. We first attempt to confirm empirically that diversification into non-agricultural income can be survival- or opportunity-driven. We estimate a choice model where we allow individuals to

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<sup>1</sup> See e.g. Reardon (1997), Reardon et al. (1998), Ellis (2000), and Haggblade et al. (2005).

choose between the two types of non-agricultural diversification and where staying on the farm is the reference category. The model is estimated on data from a household survey conducted by the authors in Kakamega district in Western Kenya that can be considered as representative for the densely populated rural areas of many parts of Eastern sub-Saharan Africa. Our empirical findings appear to confirm the existence of survival-led and opportunity-led diversification. We then examine the poverty and inequality implications of the differently motivated diversification strategies, which we find to correspond only partly to the expected patterns. Whereas high-return activities are confined to richer households, low-return activities constitute an important income source for households across the entire income distribution. The latter finding implies that the marginal impact of more income from low-return activities is more or less distributionally neutral. In sum, the analysis points to the presence of important asset constraints, but also to very limited and risky opportunities outside agriculture; this is why even wealthier households tend to engage in low-return activities.

We proceed as follows. In the first section we shortly review the theoretical and empirical literature on non-agricultural activities and their poverty and distributional implications. Then, we provide evidence on the incidence and characteristics of the non-agricultural economy in the study region. Subsequently, we present the results of the choice model and, based on this typology of non-agricultural incomes, examine the poverty and inequality implications. The last section concludes with policy implications and an outlook for future research.

## The Rural Non-agricultural Economy: Theory and Empirics

The non-agricultural economy involves employment outside the realm of direct soil cultivation and cattle breeding and includes activities such as services, construction, mining, commerce, manufacturing and processing. Such activities are often pursued through self-employment, but there is also a non-agricultural wage labour market, although this market is typically small in the rural sub-Saharan African context. The contribution of these activities to household income in the developing world in general and sub-Saharan Africa in particular is substantial. Haggblade et al. (2005) observe that non-agricultural income contributes between 30 to 45 per cent of rural household incomes in the developing world. Reardon et al. (1998) put this share at 42 per cent for sub-Saharan Africa, while Reardon (1999) gives estimates of 32 per cent and 40 per cent for Asia and Latin America, respectively. Ellis (2000) reports

somewhat higher figures from case studies in sub-Saharan Africa in a range of 30 to 50 per cent.

### *Low- vs. High-return Activities and Drivers of Participation*

Rapid population growth and the related pressure on the natural resource base, in particular land, have been identified as major causes for the rise of non-agricultural activities in sub-Saharan Africa.<sup>2</sup> In addition, supply factors, such as technological advances and the expansion of educational attainment, as well as demand shocks, including higher per capita incomes and increased demand for non-food goods and services, have been driving forces (Reardon 1997).

In order to understand how these variables affect the participation in and patterns of non-agricultural employment and the related incomes, it is useful to differentiate between survival-led and opportunity-led diversification into non-agricultural activities.

When non-agricultural diversification is pursued to ensure survival, for example because of land constraints, it is also referred to as distress-push diversification (cf. Islam 1997; Reardon et al. 2000; Barrett, Reardon and Webb 2001). Such diversification will be in low-return non-agricultural activities and may be an indication that the non-agricultural sector is absorbing labour that cannot be employed in agriculture. In contrast, rural households may face new opportunities outside agriculture because of technological advances, the intensification of links with markets outside the local economy, or local engines of growth, such as commercial agriculture or proximity to an urban area.<sup>3</sup> If non-agricultural income diversification can be traced back to such factors, it is also regarded as demand-pull diversification.

While the aggregate prevalence of the specific type of non-agricultural diversification in a region (or country) will hence be driven by meso (or macro) determinants, household characteristics will decide on the individual household's diversification decision. The literature has stressed asset availability and educational endowments as key participation determinants of non-agricultural diversification (Barrett, Reardon and Webb 2001; Escobal 2001). Whereas entry barriers to low-return diversification should be low, they can be considerable for high-return activities. In the presence of underdeveloped credit markets, the latter typically require sufficient cash income, in particular from livestock, cash cropping, and/or remittances, both for initial investment and as working capital (Reardon et al. 2000;

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<sup>2</sup> See e.g. Bryceson and Jamal (1997), Barrett, Bezuneh, Clay and Reardon (2000), and Bryceson (2002).

<sup>3</sup> For more detailed explanations see e.g. Reardon (1999) or Haggblade et al. (2002).

Barrett, Bezuneh and Aboud 2000). Skill requirements may impose another important entry constraint (Dercon and Krishnan 1996; Reardon 1997). Some high-return non-agricultural activities such as skilled wage employment are restricted to those with formal education.<sup>4</sup>

Non-agricultural diversification constitutes an important means to deal with risk and smooth income and consumption in rural areas. This is not surprising since agricultural livelihoods are often subject to great uncertainty. In such an environment, diversification aims at lower covariate risk between different household activities to smooth consumption (Bryceson 1999; Dercon 1998, 2002; Francis and Hoddinott 1993). For our discussion, it is useful to distinguish between *ex-ante* risk management and *ex-post* risk coping strategies. Engagement in high-return non-agricultural activities represents an *ex-ante* risk management strategy, as it is unlikely that entry barriers can be easily overcome after a negative shock. In contrast, low-return non-agricultural diversification will figure prominently as an *ex-post* coping strategy, i.e. households will relocate labour towards these activities after they have been hit by a negative agricultural shock, typically a weather shock. Yet, in particular poorer household may also be willing to accept lower returns than in agriculture *ex-ante* in exchange for lower covariate risk.

While rural household risk can be reduced by venturing into non-agricultural activities, risk considerations may also play a role when deciding between different types of non-agricultural activities. If high-return activities are more risky than low-return activities, households able to overcome possible entry barriers may engage in both types of non-agricultural activities according to their risk preferences.

The empirical literature on the rural non-agricultural economy has emphasised the drivers of participation in these activities at the individual, household, and community level. Some of the empirical contributions have distinguished between low- and high-return activities in doing so. Studies in sub-Saharan Africa, Asia, and Latin America have confirmed that the level of formal education is positively correlated with participation in non-agricultural activities, in general, and high-return activities, in particular (Ferreira and Lanjouw 2001; Lanjouw 2001). Land and other productive assets have also been demonstrated to be important determinants of different types of diversification strategies (e.g. Seppala 1996; Elbers and Lanjouw 2001; Marenja et al. 2003). For instance, Elbers and Lanjouw (2001) show that land scarcity is a driving force of participation in a low-return non-agricultural

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<sup>4</sup> Specific emphasis is given here on the role of formal education in skilled non-agricultural wage employment (e.g. Corral and Reardon 2001; Lanjouw 2001; Reardon 1997).

activity while more landholdings seem to provide collateral for investment in high-return non-agricultural businesses. Another household level factor correlated with participation in non-agricultural activities is the size and structure of the household (Corral and Reardon 2001; Reardon 1997). Reardon (1997) shows that a larger size enables households to supply more labour to non-agricultural activities, since sufficient family members remain at home to meet labour demands for agricultural subsistence. As regards community level determinants, most empirical studies confirm an important role for physical and institutional infrastructure, such as paved roads, efficient communication facilities and provision of rural electrification.<sup>5</sup>

### *Non-agricultural Incomes, Poverty and Inequality*

There are limited empirical accounts of the relationship between farm households' income composition and inequality, in particular for sub-Saharan Africa. Moreover, most existing studies do not distinguish between different types of non-agricultural activities (e.g. Adams 2002). From the above discussion, it has become apparent that the equity impact of non-agricultural employment depends on the type of activity. Early work on the informal sector (ILO 1972) claims that, given their intrinsic characteristics, such as easy entry, non-agricultural activities will decrease income inequalities, particularly through self-employment. While low-return activities undertaken by poorer households should hence be inequality-decreasing, high-return activities may well increase inequality, as they tend to reinforce asset inequalities. Accordingly, Haggblade et al. (2005) observe that because of the differing equity impact of various segments of these activities, their overall effect on income distribution remains mixed. Thus, depending on the nature of non-agricultural activity undertaken and the underlying motivation, aggregate non-agricultural earnings improve equity in some instances, while they aggravate inequality in others.

This explains the differing results of empirical studies on the equity impact of non-agricultural activities. In fact, most empirical studies tend to find that non-agricultural incomes go primarily to the better-off so that higher non-agricultural incomes (as opposed to more non-agricultural income earners) are associated with higher income inequality. For example, case studies on Burkina Faso by Reardon et al. (1992) and on Ecuador by Elbers and Lanjouw (2001) find that the income share from non-agricultural sources increases with per capita income. For Mexico, de Janvry and Sadoulet (2001) show non-agricultural wages to be inequality-increasing, while non-agricultural self-employment tends to decrease inequality.

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<sup>5</sup> For details see e.g. Lanjouw and Feder (2000) and Jalan and Ravallion (1998).



Some empirical studies show an inequality-decreasing effect of non-agricultural activities, e.g. by Norman et. al. (1982) on rural households in Northern Nigeria or Adams (2002) on Egypt.

It is likely that these seemingly contradictory findings could be reconciled by an analysis of the underlying type of non-agricultural activities. Once this is understood, the conditions that drive the prevalence of one type of non-agricultural activity or another should be addressed, as they eventually represent the fundamental causes of the inequality implications. According to Reardon et al. (1998) such conditions include the proximity to urban markets, physical and market infrastructure, resource endowments and the distribution of productive resources within rural areas. In the following, we will (i) assess which kind of activities prevail in the poverty-ridden context that we have studied and (ii) examine whether the poverty and distributional consequences correspond to the patterns one could expect under the specific conditions in the study region.

## The Pattern of Non-agricultural Activities in Kakamega: Boda-bodas Rule

The data for our analysis come from a household survey which was conducted in Kakamega district, a densely populated rural area of Western Kenya, in the last quarter of the year 2005. The survey used a two-stage sampling technique and covered 375 households with a total of 1950 household members, which were spread over 20 clusters. One cluster, however, was excluded from our sample as it was mainly inhabited by teachers who had been sent to the study region.<sup>6</sup> Six of the remaining clusters were located in urban or peri-urban areas. Nevertheless, households in these clusters derive a substantial amount of their income from agriculture-related activities and therefore form part of our sample.<sup>7</sup>

In the following, we give an overview of the structure of household income and non-agricultural employment patterns in the study region, taking into account the different character of low-return and high-return activities. In contrast to other authors, e.g. Ferreira and Lanjouw (2001) who define high-return non-agricultural activities as those whose monthly returns are above the poverty line, our definition is more complex. On the one hand,

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<sup>6</sup> Though non-agricultural employment comprises teaching activities, the observed patterns in this cluster are not compatible with the idea of rural income diversification.

<sup>7</sup> Kakamega district has a population of about 700,000. Note that the largest urban agglomeration in the region, the district capital Kakamega Town, has a population of about 85,000, which only partly resides in a strictly urban setting.

activities based on self-employment are considered to be high-return activities if the household enterprise employs at least one hired worker or two household members. Given the rural character of the Kakamega district, such-defined enterprises can well be assumed to generate higher incomes than remaining in traditional agricultural activities. On the other hand, the definition of wage-based high-return activities draws on specific sectors which typically exhibit entry constraints. In our view, these entry barriers should not only encompass special skills or assets requirements, but also such simple hurdles like a clean and healthy appearance, which some poor households may well not be able to overcome. Accordingly, the following sectors offer high-return wage-employment in the study region: repair of motor vehicles, medical services, hair dressing and beauty, churches/NGOs/international organisations, and hotels and restaurants. This definition is bolstered by the fact that high-return wage-employment can only be found as primary occupation and not as a secondary one for all individuals in the sample. It is important to note that we exclude employment in the public sector from our analysis. Entry barriers in this segment are likely to be very different from those in other high-return activities, as public employment is often arranged by nepotistic and corrupt structures.

All remaining forms of non-agricultural employment, i.e. household enterprises which are run by one household member only and wage-employment in non-agricultural sectors other than the ones mentioned above, constitute low-return non-agricultural activities. With this definition of low-return and high-return non-agricultural employment, we believe to adequately reflect the idea of survival-led and opportunity-led income diversification.

Table 1a shows the participation rates of households in different types of activities. It reveals that households in Kakamega district earn income from a variety of activities.<sup>8</sup> As can be expected for a rural region, almost 90 per cent of the households work at least partly in agriculture. Still, 46 per cent engage in low-return and 20 per cent in high-return non-agricultural activities, which makes just about a third of all households rely exclusively on agricultural activities.

Table 1b presents a matrix of agricultural and non-agricultural income-generating activities of households. The rows show in which activities households are engaged *in addition* to the activities indicated in the columns. Accordingly, households on the diagonal line do not diversify their income sources.

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<sup>8</sup> Our analysis includes both primary and secondary non-agricultural employment.

Out of all farming households, only 40 per cent are fully specialised in agriculture, while about 55 per cent diversify into non-agricultural activities, primarily into low-return activities. Non-agricultural income, however, also constitutes the only income source for roughly 20 per cent of all households. Again, the majority can be found in low-return activities. This relatively high proportion is principally due to the fact that our sample still includes the urban and peri-urban clusters to give a more complete overview of the income-generating activities in the study region. Moreover, the table illustrates that more than a third of the households engaged in non-agricultural high-return activities also pursue some low-return activity. This finding might be explained by our previous assertion that the high-return sector is associated with higher risks or limited opportunities for further investments.

**Table 1a: Participation of Households in Income-generating Activities**

	Agriculture	Non-agricultural activities			Public employment	No activity
		All	Low-return	High-return		
hhs with respective activity	315 <i>87.02</i>	214 <i>59.12</i>	166 <i>45.86</i>	73 <i>20.17</i>	26 <i>7.18</i>	3 <i>0.83</i>

Note: Column percentages provided in italics.—The total number of households is 362.

Source: Authors' calculations.

**Table 1b: Income Diversification Strategies of Households**

	Agriculture	Non-agricultural activities			Public employment	No activity
		All	Low-return	High-return		
Agriculture	125 <i>39.68</i>	174 <i>81.31</i>	134 <i>80.72</i>	56 <i>76.71</i>	22 <i>84.62</i>	
All non-agr. activities	174 <i>55.24</i>	40 <i>18.69</i>			6 <i>23.08</i>	
Low-return	134 <i>42.54</i>	166 <i>77.57</i>	23 <i>13.86</i>	25 <i>34.25</i>	5 <i>19.23</i>	
High-return	56 <i>17.78</i>	73 <i>34.11</i>	25 <i>15.06</i>	8 <i>10.96</i>	2 <i>7.69</i>	
Public employment	22 <i>6.98</i>	6 <i>2.80</i>	5 <i>3.01</i>	2 <i>2.74</i>	4 <i>15.38</i>	
Total	315	214	166	73	26	3

Note: Column percentages provided in italics. Due to the fact that a number of households are involved in more than two income-generating activities, the percentage shares do not add up to 100 per cent.

Source: Authors' calculations.

Since the focus of this paper is on rural income diversification, we now confine our sample to households which have access to at least half an acre of land and engage in agricultural activities. This step makes the sample more likely to include only those households which diversify out of agriculture and not the ones which have some limited supplementary agricultural activities. Virtually all excluded households are from urban or peri-urban areas, as landlessness in rural areas is practically not observable in the study region.

Based on this sample, we compile a detailed profile of non-agricultural activities in Kakamega district<sup>9</sup>, which clearly reveals that the rural non-agricultural sector is dominated by low-return activities and provides relatively little space for high-return activities. In addition, most of the non-agricultural activities take the form of household enterprises. In total, we find 136 such enterprises in the sample, 99 of which belong to the low-return segment. This compares to 37 wage-employed individuals, out of which 19 are in the low-return segment. Thus, in the case of wage-employment the frequency of low-return and high-return activities seems to be roughly equal.

As regards high-return wage-employment, all recorded activities belong to the service sector. Most individuals work with churches, NGOs or international organisations, followed by hotels and restaurants. Interestingly, the same number of men and women are engaged in these activities, suggesting that both sexes have equal access to them. In contrast, low-return wage-employment seems to favour men as it often requires physical strength though most activities again belong to the service sector. Only 4 out of the 19 individuals in this segment of non-agricultural employment are women. The most frequent low-return wage activities include security, food production, and retailing. Women, however, are solely active in retailing, house-help, and informal services.

Micro and small businesses are involved in a fairly wide range of activities, primarily retailing, informal services such as shoe-shining and washing, boda-boda transportation, and construction.<sup>10</sup> Only in the sphere of retailing can we find a concentration of both low-return and high-return household enterprises. This suggests that low-return and high-return businesses operate in relatively segmented markets. Informal services and boda-boda transportation are exclusively provided by low-return enterprises, whereas formal services

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<sup>9</sup> Tables A1–A3 in the appendix provide descriptive statistics of non-agricultural employment for this sample. Whereas the first two tables show low-return and high-return non-agricultural wage-employment in the study region by sector of activity and sex, the third table displays self-employment by sector of activity and distinguishes between household enterprises in the low-return and high-return sector.

<sup>10</sup> Boda-bodas hence do not “rule” in a statistical sense, but this activity dominates the observer’s impression in the field as the boda-boda drivers tend to gather along the rural roads.

and food production are clearly dominated by high-return businesses. Some manufacturing activities can be observed in non-agricultural self-employment. These comprise food production, carpentry, and the manufacturing of textile products.

We now turn to an analysis of the determinants of rural non-agricultural employment in the study region. First, we inspect the shares of income from agricultural and non-agricultural activities by basic characteristics of the household head and the household itself. Subsequently, we estimate a multivariate choice model of participation in different types of non-agricultural activities.

Table 2 presents income shares from different sources tabulated by some key determinants of participation in non-agricultural activities. The household's total gross monthly income is computed as the sum of all income from wage or self-employment in the low and high-return non-agricultural sector, farm income including the imputed value of unsold farm produce as well as other income sources such as pensions or remittances. Income from employment in the public sector is subsumed under other income.

Overall, income from non-agricultural activities constitutes a major source of income in rural areas of Kakamega district, accounting for 23 per cent of total income. Yet, this share is below the averages that have been found in similar studies for sub-Saharan Africa. The main reason for this should be the remoteness and traditionally purely agricultural character of the region, but probably also the dominance of low-return activities.

We find that throughout all age groups of the household head agriculture remains the dominant income source, as it always accounts for at least half of all household income. As the age of the household head rises, however, the share of agricultural income increases significantly with the share of income from non-agricultural employment dropping sharply. This observation is true for both low-return and high-return non-agricultural activities though the share of low-return income is consistently higher than the share of high-return income. We may relate this pattern to the fact that under traditional land subdivision and inheritance norms older household heads have better claim to land resources. This gives them a head start when it comes to agricultural activities, whereas younger household heads will have to embrace non-agricultural strategies to secure their livelihoods.

**Table 2: Shares of Income from Agricultural and Non-agricultural Activities (in per cent)**

	Households in respective category	Income from				
		All non-agricultural activities	Low-return	High-return	Agriculture	Other sources
All		23	16	7	67	10
Age of household head						
–25	6	40	28	12	53	7
25–35	25	29	20	9	64	7
35–45	22	29	20	9	59	11
45–55	18	18	11	6	67	15
55–	30	12	9	4	79	9
Sex of household head						
Male	72	27	18	9	65	9
Female	28	13	10	3	74	14
Level of formal education of household head						
No formal education	51	22	16	5	72	6
Complete primary school	30	24	17	7	68	8
Secondary school	11	25	11	14	61	15
Higher education	8	23	11	12	42	35
Land size in acres						
0.5–1	37	27	21	6	62	11
1–3	42	19	12	7	71	10
3–	21	23	12	10	69	8
Location						
Rural	89	21	15	6	70	9
Urban and peri-urban	11	35	18	17	48	17

*Source:* Authors' calculations.

Looking at the sex of the household head, the table shows that households with a female head earn considerably lower income shares from both types of non-agricultural activities. Given the lower number of adult members in female-headed households and the numerous tasks of their heads in agriculture, housekeeping and child-rearing, these households' ability to engage in non-agricultural employment is likely to be limited.

At first sight, it seems to be puzzling that the share of non-agricultural income does not rise with the level of formal education. Across all levels of formal education, income from non-agricultural activities accounts for roughly 25 per cent of total household income. However, the real relationship between non-agricultural income and educational attainment is clouded by the dichotomy of the non-agricultural sector. When considering income from low-return and high-return activities separately, the expected pattern arises. The share of low-return non-

agricultural income falls with the educational level of the household head, whereas the reverse is true for the share of high-return non-agricultural income. The observation that the income share from agricultural activities steadily decreases with educational attainment can be explained by the income earned from employment in the public sector, which is included in income from other sources. As can be clearly seen, the share of the latter rises strongly with educational attainment. Households whose head has a higher education<sup>11</sup> degree earn as much as 30 per cent of their income in the public sector.

The tabulation of the share of total non-agricultural income with total land holdings generates a U-shaped relationship. Whereas households with low endowments of land earn about 27 per cent of their income from non-agricultural activities, this share falls to 19 per cent for medium-endowed households, and then rises again to 23 per cent for households that are highly endowed with land. A separate inspection of the shares of income derived from low-return and high-return activities again reveals the two-pronged diversification behaviour. The share of income from low-return activities drops sharply with increasing landholdings. The opposite effect is observable for the income share of high-return activities. For many households in sub-Saharan Africa, land is a key asset and serves multiple uses including cultivation, sustaining livestock, storing wealth, and providing collateral for financial credit. With this in mind, the findings support the notion that declining farm sizes and related declines in soil fertility force land-poor households to diversify into non-agricultural employment to ensure survival. At the same time, higher land endowments may enable households to diversify into high-return activities as land may serve as collateral for credit or simply provide higher cash flows from agriculture for the necessary start-up capital.

Although we consider only households which are active in agriculture and have access to at least half an acre of land, the share of non-agricultural income considerably varies with the location of the household. Whereas rural households earn about 20 per cent of their income in the non-agricultural sector, the corresponding figure climbs to 35 per cent for households in peri-urban or urban areas. It is especially income from high-return activities that plays a more important role for households in urban places as compared to their counterparts in rural sites. This lends credence to the notion that rural non-agricultural activities are closely linked to the infrastructural benefits in the urban areas, which also provide access to markets and linkages to the formal sector.

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<sup>11</sup> Here, higher education comprises vocational training as well as tertiary education.

With the results of the univariate analysis above in mind, we now turn to a multivariate choice model to shed more light on the possible determinants of engagement in the rural non-agricultural sector. This allows us to consider individual choice determinants beyond the household head's characteristics and to test whether the univariate results also hold once we control for other factors. We estimate a multinomial logit model where we allow individuals (not households) to choose between the two types of non-agricultural activities and staying on the farm. The results are presented in Table 3. The table reports odds ratios of low-return and high-return non-agricultural activities vis-à-vis agricultural ones in the first two columns and the odds of choosing high- vs. low-return activities in the last column. In line with the theory outlined above and existing empirical work, the explanatory variables include individual characteristics, such as age, gender and formal education, household composition variables, household assets, such as land and livestock, and the distance to the nearest access road as well as an urban/peri-urban dummy as proxies for access to infrastructure and markets. We expect the diversification behaviour of sugarcane farmers to be different from other farm households as the period between the cash flows from sugarcane harvests can be longer than 3 years.<sup>12</sup> Given this cycle and lacking access to financial markets, we expect sugarcane farmers to invest their considerable cash income in non-agricultural activities, particularly in the high-return segment, in order to smooth their income. Sugarcane farmers, however, may also be forced into the low-return segment once the last harvest's cash has been consumed.

Overall, the results underline our assertion that the non-agricultural sector has to be seen as consisting of two sub-sectors which are separated by entry barriers. Yet, the results are less clear-cut than one might expect from the above univariate analysis that was based on household head characteristics. It should be borne in mind though that our sample is relatively small.

Since the two types of non-agricultural activities might be more similar than staying on the farm, we test for independence of irrelevant alternatives using the Hausman test. The null hypothesis, i.e. the odds of choosing between alternatives a and b are affected by the existence of alternative c, can be rejected at the one per cent level. Hence, the test does not reject our hypothesis of the different characteristics of low-return and high-return non-agricultural activities. This result also implies that the applied multinomial logit and not a nested logit model, which would assume a two-step decision (first participation in non-agricultural

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<sup>12</sup> On average, it takes twenty-four months before a commercial sugarcane crop is harvested. Even after harvest, it may take more months before payments are actually made to the farmers.



activities, then participation in low- or high-return segment), is the appropriate econometric model.

Most effects of the included explanatory variables have the expected sign, but some variables do not turn out to be significant. Yet, the analysis also yields some unexpected results that we will try to explain below. The effect of age corresponds to expectations, as younger individuals are more likely to be engaged in both low- and high-return non-agricultural activities rather than in agriculture. The reported odds ratios of 0.97 and 0.96 imply that the odds of being engaged in non-agricultural activities decrease by three per cent for low-return and four per cent for high-return activities for a unit change in the predictor, i.e. for one additional year of age. According to the estimation, age does not seem to affect the choice between low- and high-return activities.

With regard to gender, we find that females are much more likely to work in agriculture, but if they do work in non-agricultural activities, they are more likely to do so in high-return activities. Interestingly, we find different effects for individuals who live in female-headed households. Individuals from these households are more than twice as likely to participate in low-return non-agricultural employment as compared to agricultural ones. This result may not be too surprising as women's access to land is typically limited. Together with the above finding that female-headed households earn considerably less income from non-agricultural activities than their male-headed counterparts, this suggests that income from these activities must be rather low.

As regards formal education, we might have expected it to have only little or no influence on participating in low-return activities and a significant positive effect on the probability to participate in high-return non-agricultural activities. We find primary education to have a significant positive impact on entering non-agricultural employment, but not on the odds of being in either type. The effects of uncompleted and completed secondary education show the expected signs and strengths. Yet, most of them are not significant. Non-university tertiary education has a very strong impact on the probability to have a non-agricultural job in the low-return segment. University education, in contrast, seems to make it very unlikely for an individual to choose low-return non-agricultural employment, whereas it increases the likelihood of choosing high-return non-agricultural activities rather than agricultural ones more than threefold. Taken together, the comparatively minor effects of formal education dummies might give reason to be concerned about the quality of formal education, at least

what regards its capacity to provide the skills necessary to grasp the few business opportunities available in the study area.

The household composition variables exert the expected effects. The more prime age adults a household has, the more likely is its participation in non-agricultural, particularly low-return, activities. This labour may thus no longer be productively employed in agriculture. It is especially the number of people aged 60 or above which raises the odds of being involved in the low-return non-agricultural sector. The presence of elderly household members might facilitate younger members to work outside home in non-agricultural activities by assisting in housekeeping and child-rearing.

Our analysis considers two types of assets, total land and livestock holdings. We find that the likelihood of engaging in low-return non-agricultural activities significantly increases with declining landholdings, hence confirming our hypothesis of survival-led diversification strategies due to land constraints. We might have expected the opposite effect on the probability of being in high-return activities but land size turns out to be insignificant, also when considering the odds of engaging in high vs. low-return activities. This suggests that land, e.g. through providing collateral for credit, does not appear to play a key role in setting up a high-return activity. Livestock holdings are positively associated with non-agricultural activities although this effect is not significant. Yet, as expected, there is a significant positive effect of livestock assets on the probability of high-return vs. low-return activities.

For sugarcane farmers, we also find the expected effects. The period that has passed since the last sugarcane harvest seems to have a significant positive impact on participation in either type of non-agricultural activity.

The effects of infrastructure are less clear-cut. Whereas being located in a peri-urban or urban area appears to considerably increase the likelihood of high-return non-agricultural employment, the distance to the nearest access road does not seem to play a role in the decision to involve in non-agricultural activities. Better access to markets implies that it is also easier to sell agricultural produce, thereby making agriculture a more profitable activity.

**Table 3: Multinomial Logit Model of Rural Non-agricultural Employment**

	Low-return vs. agriculture	High-return vs. agriculture	High- vs. low-return
Age	0.97 (2.92***)	0.96 (3.44***)	0.99 (0.62)
Female	0.32 (4.31***)	0.58 (2.08**)	1.81 (2.52**)
Primary completed	1.77 (1.88*)	1.77 (1.65)*	1.00 (0.00)
Secondary uncompleted	1.28 (0.52)	2.40 (1.96**)	1.87 (1.35)
Secondary completed	1.52 (0.96)	1.95 (1.62)	1.28 (0.48)
Vocational training	1.50 (0.28)	1.90E-16 (35.71***)	5.13E-14 (24.07***)
Non-university tertiary education	7.70 (3.31***)	2.80 (1.32)	0.36 (1.54)
University education	1.08E-16 (25.08***)	3.12 (0.57)	3.24E09 (10.98***)
Number of children (0–4)	0.93 (0.61)	1.22 (1.43)	1.32 (1.61)
Number of children (5–14)	1.02 (0.25)	0.95 (0.46)	0.92 (0.59)
Number of adults (15–60)	1.11 (1.32)	1.07 (0.64)	0.97 (0.34)
Number of old people (>60)	1.98 (2.38**)	1.00 (0.00)	0.50 (1.69*)
Female household head	2.10 (2.08**)	0.65 (1.01)	0.31 (2.58***)
Landsize	0.88 (2.51**)	0.95 (1.01)	1.07 (0.97)
Livestock value	1.00 (1.25)	1.00 (1.21)	1.01 (1.98**)
Sugar cane dummy	0.67 (0.87)	0.54 (1.33)	0.81 (0.40)
Sugar cane period	1.38 (1.79*)	1.42 (1.67*)	1.03 (0.15)
Road distance	1.00 (0.89)	1.00 (0.87)	1.00 (0.53)
Urban or peri-urban dummy	0.84 (0.40)	1.94 (1.49)	2.32 (1.67*)
Observations	438	438	438
Wald chi2(38)	7033.30		
Log pseudo-likelihood	-418.24		
Pseudo R2	0.11		

Note: Robust z statistics in parentheses. \* significant at 10 per cent, \*\* significant at 5 per cent, \*\*\* significant 1 at per cent

Source: Authors' calculations.

The investigation into the patterns of non-agricultural activities in Kakamega district has shown that income diversification is a widely observed phenomenon and that non-agricultural income contributes significantly to income earned by farm households. Furthermore, we observe that “boda-bodas rule”, i.e. households primarily pursue low-return non-agricultural activities. The results of the multinomial logit model lend support to the hypothesised dichotomy of non-agricultural activities and point to the existence of entry barriers to high-return activities.<sup>13</sup> The analysis has shed some light on the conditions that give rise to the prevalence of low-return activities, in particular land constraints. Given the importance of non-agricultural incomes in the Kakamega district and the observed dichotomy of low-return and high-return activities, we now turn to the analysis of the poverty and distributional implications of these different diversification strategies.

## Poverty and Distributional Implications

Table 4 shows the participation rates in non-agricultural activities and the respective income shares by per adult equivalent expenditure quintiles for those households that are involved in the non-agricultural sector. Surprisingly, participation in low-return activities is not concentrated among poor households. In fact, participation is even lowest among households in the poorest quintile, peaks in the second and third quintile, and is still around 40 per cent in the two highest quintiles. Yet, despite relatively low participation, the income share derived from low-return activities is by far the highest for households in the poorest quintile. With increasing living standards, this share declines considerably. As regards high-return activities, barriers seem to effectively exclude the poorest households from such diversification strategies. Only starting from the second quintile do households pursue high-return activities. Participation in the high-return sector as well as the derived share of income then increase strongly with higher consumption levels.

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<sup>13</sup> Yet, these results should be interpreted with some caution as we estimate a simple reduced form model and do not control for potential endogeneity of some variables.

**Table 4: Participation in and Income Share of Non-agricultural Activities, by Expenditure Quintile (in per cent)**

Expenditure Quintile	Participation			Average share of non-agricultural income			Median share of non-agricultural income		
	All	Low-return	High-return	All	Low-return	High-return	All	Low-return	High-return
Bottom	38	36	2	45	43	3	47	43	0
2nd	63	50	16	38	31	7	31	31	0
3rd	55	45	18	44	32	12	36	24	0
4th	61	39	25	39	24	15	38	14	0
5th	62	42	29	41	17	24	37	14	0

*Source:* Authors' calculations.

To better understand the inequality implications of the different types of non-agricultural activities, we decompose the Gini coefficient of income inequality by income source, using the approach described in Lerman and Yitzhaki (1985) and in Stark, Taylor and Yitzhaki (1986). The decomposition allows us to determine the impact that a marginal change in a particular income source would have on overall inequality. The results are reported in Tables 5 and 6. The last column of the two tables refers to the point change in the Gini that would be brought about by a one per cent increase in the respective income source. Three additional elements are included in the result tables: The share of each income source in total income, the Gini of the income source, and the correlation of income from the respective source with a household's per adult equivalent total income rank. Table 5 considers both diversifying and non-diversifying households whereas Table 6 only looks at diversifying households.

Despite the significantly lower participation rates for high-return activities, both tables show that the total income share of high-return activities is not much lower than that of low-return activities. The previous observation that participation in the high-return sector increases with living standards is reflected in the strong correlation of high-return income with the rank of per adult equivalent total income. Together, these findings imply an inequality-increasing impact of high-return activities. Indeed, the source Ginis (0.88 and 0.93) demonstrate that income from high-return activities is the most inequitably distributed source of income. Accordingly, we find that a percentage change in income associated with high-return activities brings about a remarkable rise in inequality. Considering diversifying households only, the Gini elasticity stands at 0.106, while it is about 0.062 when also including pure farming households.

In contrast, the source Ginis for income from low-return activities (0.70 and 0.83) are markedly lower than their high-return counterparts. This echoes the fact that income from

low-return activities constitutes an important income source for households across the entire income distribution, which can also be seen by the relatively low correlation of low-return income with the rank of total income. Consequently, the effect of a marginal increase in low-return income on overall inequality is small. For diversifying households only, the elasticity of the overall Gini coefficient is negligible (0.009), and it is small for all households (0.022).

**Table 5: Inequality Decomposition by Sources, All Households**

Income source	Income share (%)	Gini coefficient of income source	Correlation with rank of total income	Elasticity of overall Gini coefficient
Low-return	19	0.83	0.68	0.022
High-return	14	0.93	0.80	0.062
Agriculture	50	0.45	0.78	-0.162
Other income	17	0.90	0.82	0.078
Total income		0.51		

Note: Other income includes income from public employment.

Source: Authors' calculations.

**Table 6: Inequality Decomposition by Sources, Only Diversifying Households**

Income source	Income share (%)	Gini coefficient of income source	Correlation with rank of total income	Elasticity of overall Gini coefficient
Low-return	28	0.70	0.66	0.009
High-return	20	0.88	0.77	0.106
Agriculture	44	0.41	0.70	-0.153
Other income	8	0.91	0.74	0.038
Total income		0.45		

Note: Other income includes income from public employment.

Source: Authors' calculations.

Our results also show that income from agricultural activities stands out as the most equitably distributed source of income. A marginal increase of agricultural income would even result in a sizeable reduction of overall inequality. This mirrors the earlier finding that for the poorest quintile overall participation rates in the non-agricultural sector are particularly low.

Having looked at the impact that a marginal change in a particular income source would have on overall inequality, we now examine the impact of such changes on different poverty measures. For this purpose, we increase a household's income from the respective sources by 50 per cent to create sizeable poverty effects. We then calculate the corresponding per adult

equivalent amount of this additional income and add it to the actually observed per adult equivalent expenditure level.<sup>14</sup> Table 7 summarises the results. The first and the second column show the poverty headcount and the average normalised poverty gap before increasing the respective incomes. The third and fourth columns present the resulting changes in the poverty measures after the simulated income increases.

**Table 7: Poverty Effects of a 50 Per Cent Increase in Non-agricultural Income**

	Before		After	
	P0	P1	P0	P1
Increase of non-agricultural income by 50%				
All households	75.96	45.26	-3.14	-3.24
Only households involved in non-agricultural activities	70.35	37.04	-5.52	-5.70
Increase of low-return non-agricultural income by 50%				
All households	75.96	45.26	-2.42	-2.18
Only households involved in low-return	72.28	37.94	-5.67	-5.11
Increase of high-return non-agricultural income by 50%				
All households	75.96	45.26	-0.33	-1.08
Only households involved in high-return	63.31	31.20	-1.80	-5.97

Note: Changes are reported as percentage points. The poverty line is defined on per adult equivalent expenditures. It is based on the rural poverty line used for the 1997 poverty assessments, KSh 1239 for rural and KSh 2648 for urban areas (Welfare and Monitoring Survey of that year), and adjusted to reflect inflation. Comparing maize and beans prices in urban and rural areas of the study region, we assume the urban price level in Kakamega district to be 25 per cent above the rural price level. The resulting poverty lines are then KSh 1843 for rural and KSh 2304 for urban areas, respectively.

Source: Authors' calculations.

The table illustrates that the Kakamega district is a very poor region. The overall headcount ratio is about 76 per cent with an average normalised poverty gap of 45 per cent. On average, households involved in non-agricultural activities fare considerably better. However, the dichotomy of the non-agricultural sector is strongly reflected in poverty outcomes. Whereas 72 per cent of people living in households which are engaged in low-return activities are below the poverty line, the headcount for their counterparts in high-return activities amounts to only 63 per cent. In addition, the average normalised poverty gap is markedly smaller for the latter households. Moreover, the poverty incidence among households with low-return activities is more or less the same as for all households. Yet, the intensity of poverty,

<sup>14</sup> Due to the difficulties associated with measuring income in rural areas in developing countries, expenditure levels are generally viewed as a more reliable proxy of an individual's wellbeing than income levels.

measured by the poverty gap, is much lower for households that are active in the low-return non-agricultural sector. This again reflects the fact that the poorest households engage relatively less in this sector.

A 50 per cent increase in incomes from all non-agricultural activities would result in a 3.14 percentage point decrease in the overall poverty headcount and a 3.24 percentage point decrease in the poverty gap. The bulk of this poverty reduction would be attributable to higher earnings from low-return activities which alone would reduce the headcount by 2.42 and the poverty gap by about 2.18 percentage points. The corresponding figures for incomes from the high-return sector are 0.33 and 1.08 percentage points, respectively. The relatively large poverty reduction potential of low-return activities becomes even more apparent when examining the poverty effects for households involved in the low-return and high-return non-agricultural sector separately. A 50 per cent rise in incomes from low-return activities would reduce the poverty headcount by 5.67 and the average normalised poverty gap by 5.11 percentage points for households which engage in the low-return sector. This compares to 1.80 and 5.97 percentage points if the same exercise is undertaken for households with high-return activities.

The larger simulated poverty impact for incomes from low-return activities mirrors the participation rates and income shares observed above. These activities constitute an important source of income throughout the entire income distribution. It should be noted though that in the lowest parts of the distribution, low participation rates coincide with high income shares implying that some very poor households are excluded from reaping the benefits of increased low-return activity income. On average, however, the share of income from activities in the low-return sector in total income strongly increases with decreasing expenditure levels.

A more detailed view on the distributional consequences can be obtained by looking at growth incidence curves, which plot the growth impact of a 50 per cent rise in non-agricultural income on per adult equivalent income by per adult equivalent income vintiles (figures A1 and A2 in the appendix). Considering all households, figure A1 shows that by and large increasing incomes from low-return activities would be rather pro-poor. Among the poorer half of the sample, per adult equivalent income increases by roughly eight per cent. Only from the tenth vintile upwards, does the growth rate consecutively drop to reach less than four percentage points for the highest expenditure vintile. In contrast, the growth



incidence curve for high-return activities is almost strictly pro-rich.<sup>15</sup> Whereas the poorest households are virtually excluded from this segment of the non-agricultural sector, the richest vintiles would experience a per adult equivalent income growth rate of about five percentage points. This low growth rate reflects the relatively low participation rates and low income shares even among the very rich. All in all, households in the middle of the income distribution would profit most from an overall increase in non-agricultural incomes.

The picture changes, in particular for low-return activities, when only considering diversifying households. Then, rising incomes from low-return activities would be strictly pro-poor while an increase in incomes from high-return activities would be strictly pro-rich. However, given the relative dominance of the low-return sector in the study region, the growth impact of high-return activities would be much lower than the corresponding growth impact of low-return activities. Thus, in the case of diversifying households a rise in total non-agricultural income would be in favour of the poor, above all the very poor who could boost their incomes by more than 25 per cent. Most households in the interior parts of the income distribution would see their per adult equivalent income grow by roughly the same rate of just under 20 per cent.

## Conclusions

Our analysis illustrates the important role of non-agricultural activities in a fairly typical rural East African context that would appear purely agricultural at first sight. A closer look at these activities reveals the existence of a dichotomous non-agricultural economy, where low-return activities co-exist alongside more lucrative or high-return activities. In the study region, low-return activities dominate the non-agricultural sector and the results point to land scarcity as one of the driving factors. The empirical analysis confirms the existence of skill and asset barriers into high-return activities, which eventually underlie the segmentation of the non-agricultural sector. When we examine the marginal distributional impact of higher income from high-return activities, we find it to aggravate existing inequalities, as these activities are confined to richer households.

While these findings correspond to our expectations and point to mechanisms that have been identified in earlier studies, we also detect some surprising and somewhat disturbing patterns. If engagement in low-return activities is driven by desperation, as implied by the concept of

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<sup>15</sup> We define a growth pattern as strictly pro-poor (pro-rich) when the growth incidence curve is monotonically decreasing (increasing). In the present case, the curve is 'almost pro-rich' as it falls slightly for the richest vintile.

survival-led diversification, we would expect these activities to be pursued primarily if not exclusively by poorer households. This is not the case and, in fact, participation rates for low-return activities of richer households are comparable to those of poorer ones. Accordingly, our simulations show that inequality does not change much if low-return earnings increase. Yet, due to the relatively large non-agricultural income share of lower income groups, a pro-poor income growth patterns can still be observed.

One might argue that these results are owed to Kakamega district being a particularly poor region, where just too many households are not able to overcome the entry barriers to high-return activities. However, we find a number of richer households in both low- and high-return activities. This may indicate that available resources cannot be employed more productively than in low-return activities and implies that households do not only face asset constraints or other types of entry barriers. Rather, demand for non-agricultural products that are produced by high-return activities may be too limited. Furthermore, the simultaneous diversification into low- and high-return activities may reflect the high risk being associated with high-return activities, which these households compensate by venturing into low-return activities. Finally, our findings suggest that some extremely poor households are even excluded from the latter activities, which makes them particularly vulnerable to shocks that frequently affect agriculture in this climatic zone.

Of course, one has to be careful in drawing too far-ranging conclusions from findings from a specific region. In addition, the static character of our analysis limits its contribution towards understanding the mechanisms that would explain the emergence of either type of non-agricultural activity. Research on rural livelihoods is already trying to examine such dynamics (e.g. Barrett 2004). Moreover, our work hints at a shift of research focus away from the analysis of household behaviour and household level constraints towards a closer examination of meso- or macro-level determinants of structural transformation in rural areas, in particular in sub-Saharan Africa. It is well known that poor rural households face important asset and skill constraints. In addition, new panel datasets have allowed researchers to shed light on the dynamics at the household level. Yet, if we want to understand the structural transformation and the emerging non-agricultural economy, we need to look beyond the household level and also investigate the meso or macro level drivers and facilitators of change, such as demographic pressure, resource degradation, technical change, urbanisation processes, and rural infrastructure.

Such research efforts should include a systematic assessment of where the growing non-agricultural economy in many parts of sub-Saharan Africa is heading. In light of the demographic developments and the virtually scary population projections, in particular in East Africa, answering this question will be crucial. The limited amount of cultivable land will necessarily force people out of agriculture. Only in the next five years, the population of Kakamega district is projected to grow from 700,000 today to 850,000 – a district where average farm size already stands at less than a hectare to meet the subsistence needs of more than five people. Under such circumstances, the prospects for growth and poverty reduction will crucially depend on the performance of the non-agricultural sector.

## References

- Adams, R.H. (2002). Non-agricultural income, inequality, and land in rural Egypt. *Economic Development and Cultural Change* 50 (2): 339–363.
- Barrett, C.B. (2004). Rural poverty dynamics: Development policy implications. Paper prepared for invited presentation at the 25th International Conference of Agricultural Economists. Durban, South Africa.
- Barrett, C.B., M. Bezuneh, and A. Aboud (2000). Income diversification, poverty traps and policy shocks in Côte d'Ivoire and Kenya. Department of Applied Economics and Management. Cornell University, Ithaca.
- Barrett, C.B., M. Bezuneh, C.D. Clay, and T. Reardon (2000). Heterogeneous constraints, incentives and income diversification strategies in rural Africa. Report to USAID/BASIS CRSP. Cornell University and Michigan State University.
- Barrett, C.B., T. Reardon, and P. Webb (2001). Non-agricultural income diversification and household livelihood strategies in rural Africa: concepts, dynamics and policy implications. *Food Policy* 26 (4): 315–331.
- Bryceson, D.F. (1999). African rural labour: Income diversification and livelihood approaches: A long term development perspective. *Review of African Political Economy* 26 (6): 171–189.
- Bryceson, D.F. (2002). Multiplex of livelihoods in rural Africa: recasting the terms and conditions of gainful employment. *Journal of Modern African Economies* 40 (1): 1–28.
- Bryceson, D.F., and V. Jamal (eds.) (1997). *Farewell to farms: De-agrarianisation and employment in Africa*. Aldershot: Ashgate.
- Corral, L., and T. Reardon (2001). Rural nonfarm incomes in Nicaragua: patterns, determinants and implications. *World Development* 29 (3): 427–442.
- Dercon, S. (1998). Wealth, risk and activity choice: cattle in Western Tanzania. *Journal of Development Economics* 55 (1): 1–42.
- Dercon, S. (2002). Income risk, coping strategies and safety nets. Discussion Paper 2002/22. Wider Publications.
- Dercon, S., and P. Krishnan (1996). Income portfolios in rural Ethiopia and Tanzania: choices and constraints. *Journal of Development Studies* 32 (6): 850–875.

- Elbers, C., and P. Lanjouw (2001). Intersectoral transfer, growth and inequality in rural Ecuador. *World Development* 29 (3): 481–496.
- Ellis, F. (2000). The determinants of rural livelihood diversification in developing countries. *Journal of Agricultural Economics* 51 (2): 289–302.
- Escobal, J. (2001). The determinants of nonfarm income diversification in rural Peru. *World Development* 29 (3): 497–508.
- Ferreira, F.H.G., and P. Lanjouw (2001). Rural non-agricultural activities and poverty in the Brazilian Northeast. *World Development* 29 (3): 509–528.
- Francis, E., and J. Hoddinott (1993). Migration and differentiation in Western Kenya: a tale of two sub-locations. *Journal of Development Studies* 30 (1): 115–145.
- Haggblade, S., P. Hazell, and T. Reardon (2002). Strategies for stimulating poverty-alleviating growth in the rural nonfarm economy in developing countries. International Food Policy Research Institute and the Rural Department. World Bank, Washington D.C.
- Haggblade, S., P. Hazell, and T. Reardon (2005). The rural non-agricultural economy: pathway out of poverty or pathway in? International Food Policy Research Institute and Michigan State University. Proceedings of the research workshop ‘The Future of Small-Farms’, June 26–29, 2005, UK.
- International Labour Office (1972). Employment, incomes and equality: a strategy for increasing productive employment in Kenya. Geneva: ILO.
- Islam, N. (1997). The nonfarm sector and rural development. Food, Agriculture and Environment Discussion Paper 22. Washington D.C: International Food Policy Research Institute.
- Jalan, J., and M. Ravallion (1998). Geographic Poverty Traps? Institute for Economic Development, Discussion Paper 86. Boston University.
- de Janvry, A., and E. Sadoulet (2001). Income strategies among rural households in Mexico: The role of off-farm activities. *World Development* 29 (3): 467–480.
- Lanjouw, P. (2001). Non-agricultural employment and poverty in rural El Salvador. *World Development* 29 (3): 529–547.
- Lanjouw, P., and G. Feder (2000). Rural nonfarm activities and rural development: from experience towards strategy. Draft paper. Washington D.C.: World Bank.

- Lerman, R.I., and S. Yitzhaki (1985). Income inequality by income source: a new approach and application to the United States. *Review of Economics and Statistics* 67: 151–156.
- Marenya, P.P., W. Kosura-Olouch, F. Place, and B. Christopher (2003). Education, nonfarm income, and farm investment in land-scarce Western Kenya. BASIS BRIEF 14, February 2003.
- Norman, D.W., E.B. Simons, and H.M. Hays (1982). *Farming systems in the Nigerian Savannah: research and strategies for development*. Boulder: Westview Press.
- Reardon, T. (1997). Using evidence of household income diversification to inform the study of rural non-agricultural labour market in Africa. *World Development* 25 (5): 735–748.
- Reardon, T. (1999). Rural non-farm income in developing countries. Rome: Food and Agriculture Organization.
- Reardon, T., and J.E. Taylor (1996). Agro-climatic shock, income inequality, and poverty: evidence from Burkina Faso. *World Development* 24 (5): 901–914.
- Reardon, T., C. Delgado, and P. Malton (1992). Determinants and effects of income diversification amongst farm households in Burkina Faso. *Journal of Development Studies* 28 (1): 264–296.
- Reardon, T., A. Stamoulis, M.E. Balisacan, J. Berdegue, and B. Banks (1998). The state of food and agriculture, Part III, 'Rural non-agricultural income in developing countries'. Rome: Food and Agriculture Organization.
- Reardon, T., J.E. Taylor, A. Stamoulis, P. Lanjouw, and A. Balisacan (2000). Effects of non-agricultural employment on rural income inequality in developing countries: an investment perspective. *Journal of Agricultural Economics* 51 (2): 266–288.
- Seppala, P. (1996). The politics of economic diversification: re-conceptualizing the rural informal sector in South-East Tanzania. *Development and Change* 27 (3): 557–578.
- Stark, O., J.E. Taylor, and S. Yitzhaki (1986). Remittances and inequality. *Economic Journal* 96 (3): 722–740.

## Appendix: Additional Tables and Figures

**Table A1: Number of Non-Agricultural Enterprises Including Self-employed Individuals by High- and Low-return Activities and Sector**

	Overall	Low-return	High-return
Mining and quarrying	2 <i>1.47</i>		2 <i>5.41</i>
Food production (including bakeries, butchers etc.)	5 <i>3.68</i>	1 <i>1.01</i>	4 <i>10.81</i>
Furniture, woodrelated carpentry, timber materials	3 <i>2.21</i>	1 <i>1.01</i>	2 <i>5.41</i>
Other manufacturing (clothing, textiles etc.)	6 <i>4.41</i>	5 <i>5.05</i>	1 <i>2.70</i>
Construction	8 <i>5.88</i>	6 <i>6.06</i>	2 <i>5.41</i>
Transport (own motor vehicle)	1 <i>0.74</i>		1 <i>2.70</i>
Transport (bodaboda)	11 <i>8.09</i>	11 <i>11.11</i>	
Transport (other)	2 <i>1.47</i>	1 <i>1.01</i>	1 <i>2.70</i>
Repair of motor vehicles	1 <i>0.74</i>		1 <i>2.70</i>
Other repair shops (bicycles etc.)	5 <i>3.68</i>	3 <i>3.03</i>	2 <i>5.41</i>
Retail (street vendor)	37 <i>27.21</i>	30 <i>30.30</i>	7 <i>18.92</i>
Retail (fixed stall, shop)	21 <i>15.44</i>	16 <i>16.16</i>	5 <i>13.51</i>
Medical service, hospital, pharmacies	3 <i>2.21</i>	3 <i>3.03</i>	
Hair dressing and beauty	2 <i>1.47</i>	1 <i>1.01</i>	1 <i>2.70</i>
Formal services (banking, insurance, real estate)	2 <i>1.47</i>	2 <i>2.02</i>	
Househelp	1 <i>0.74</i>	1 <i>1.01</i>	
Other informal services (shoeshining, washing etc.)	13 <i>9.56</i>	13 <i>13.13</i>	
Other formal services (security etc.)	6 <i>4.41</i>	1 <i>1.01</i>	5 <i>13.51</i>
Other	7 <i>5.15</i>	4 <i>4.04</i>	3 <i>8.11</i>
Total	136 <i>100.00</i>	99 <i>100.00</i>	37 <i>100.00</i>

Note: Column percentages provided in italics.

Source: Authors' calculations.

**Table A2: Number of Wage-employed Individuals in Low-return Non-agricultural Activities by Gender and Sector**

	Overall	Men	Women
Mining and quarrying	1 <i>5.26</i>	1 <i>6.67</i>	
Food production (including bakeries, butchers etc.)	3 <i>15.79</i>	3 <i>20.00</i>	
Construction	1 <i>5.26</i>	1 <i>6.67</i>	
Transport (boda-boda)	1 <i>5.26</i>	1 <i>6.67</i>	
Other repair shops (bicycles etc.)	1 <i>5.26</i>	1 <i>6.67</i>	
Retail (fixed stall, shop)	3 <i>15.79</i>	1 <i>6.67</i>	2 <i>50.00</i>
Wholesale	1 <i>5.26</i>	1 <i>6.67</i>	
Househelp	1 <i>5.26</i>		1 <i>25.00</i>
Other informal services (shoe-shining, washing etc.)	1 <i>5.26</i>		1 <i>25.00</i>
Other formal services (security etc.)	4 <i>21.05</i>	4 <i>26.67</i>	
Other	2 <i>10.53</i>	2 <i>13.33</i>	
Total	19 <i>100.00</i>	15 <i>100.00</i>	4 <i>100.00</i>

Note: Column percentages provided in italics.

Source: Authors' calculations.

**Table A3: Number of Wage-employed Individuals in High-return Non-agricultural Activities by Gender and Sector**

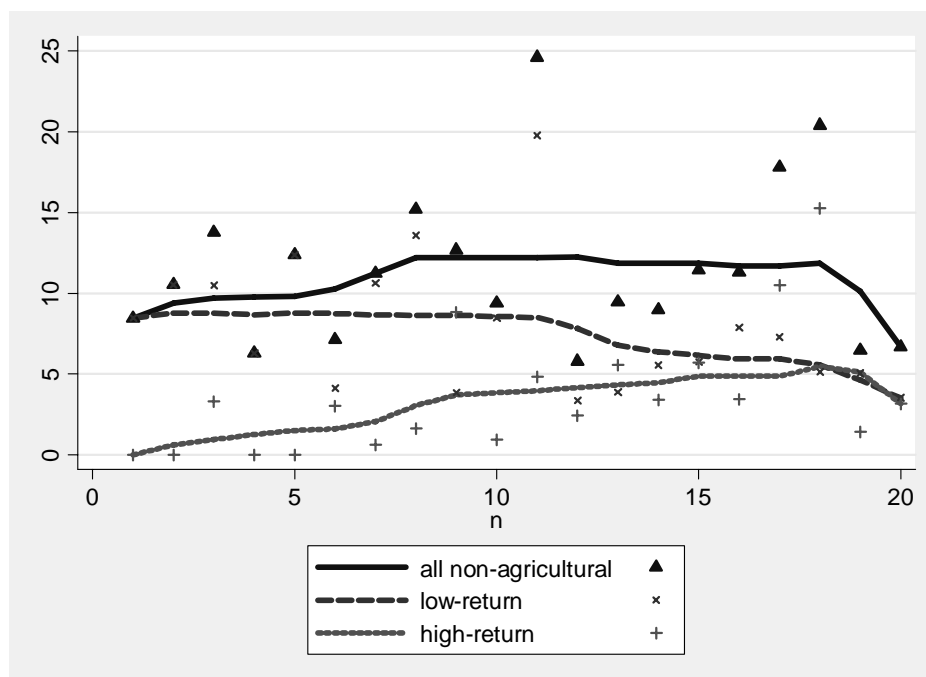
	Overall	Men	Women
Repair of motor vehicles	1 <i>5.56</i>	1 <i>11.11</i>	
Medical service, hospital, pharmacies	2 <i>11.11</i>		2 <i>22.22</i>
Hair dressing and beauty	1 <i>5.56</i>		1 <i>11.11</i>
Church, NGOs, international organisations etc.	10 <i>55.56</i>	6 <i>66.67</i>	4 <i>44.44</i>
Hotels and restaurants	4 <i>22.22</i>	2 <i>22.22</i>	2 <i>22.22</i>
Total	18 <i>100.00</i>	9 <i>100.00</i>	9 <i>100.00</i>

Note: Column percentages provided in italics.

Source: Authors' calculations.

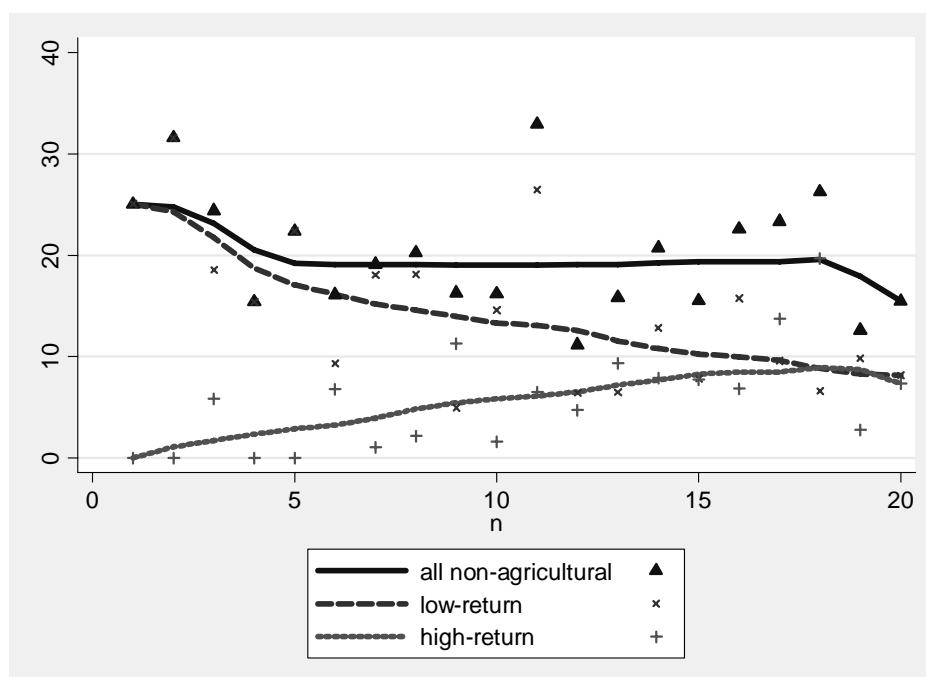


**Figure A1: Smoothed Growth Incidence Curve, 50 Per cent Increase in Non-agricultural Incomes, All Households (vertical axis: per adult equivalent income growth in percentage points, horizontal axis: per adult equivalent expenditure vintiles)**



Source: Authors' calculations.

**Figure A2: Smoothed Growth Incidence Curve, 50 Per cent Increase in Non-agricultural Incomes, Only Diversifying Households (vertical axis: per adult equivalent income growth in percentage points, horizontal axis: per adult equivalent expenditure vintiles)**



Source: Authors' calculations.