



Pergamon

Food Policy 26 (2001) 385–403

FOOD
POLICY

www.elsevier.com/locate/foodpol

Non-agricultural earnings in peri-urban areas of Tanzania: evidence from household survey data

Peter Lanjouw^{a,*}, Jaime Quizon^a, Robert Sparrow^b

^a World Bank, 1818 H. St. N.W., Washington, DC 20433, USA

^b Economic and Social Institute, Vrije Universiteit, de Boelelaan 1105, 1081 HV Amsterdam, The Netherlands

Abstract

This study draws on purposive survey data of approximately 600 households in peri-urban Tanzania to describe the degree and nature of non-farm diversification in these settings. With the exception of relatively dynamic cities such as Dar es Salaam and Arusha, overall non-farm incomes shares are not unambiguously higher than in rural areas as a whole. Non-farm income shares rise sharply and monotonically with quintiles defined in terms of per capita food consumption. In that sense the sector appears to offer an important route out of poverty. The evidence suggests that education, and access to infrastructure, are important determinants of non-farm incomes in peri-urban areas. Women appear to be poorly placed vis à vis the non-farm sector, even after controlling for education, age and other characteristics. Kinship and tribal affinities, and time devoted to communal activities, appear to deter entrepreneurial activity and non-farm employment, but trust in officials and public servants and strong heterogeneous village associations, are important in stimulating non-farm activity. © 2001 Elsevier Science Ltd. All rights reserved.

Keywords: Non-farm economy; Peri-urban sector; Poverty; Tanzania

Introduction

Rural development involves more than agricultural growth. Evidence for Africa as a whole shows, for example, that the rural non-agricultural economy is sizable

* Corresponding author. Tel.: +1-202-473-9500; fax: +1-202-522-1153.

E-mail address: planjouw@worldbank.org (P. Lanjouw).

and growing over time.¹ Surveying about 100 farm-household survey-based studies from the 1970s–1990s, Reardon et al. (1998) find an average non-farm income share of 42% in Africa, followed by 40% in Latin America, and 32% in Asia² The non-farm sector refers to a far from homogeneous set of activities. Because of the sector's great heterogeneity, policies for a given country must be founded on detailed analysis of the sector in that specific country.

This paper attempts to fill in some of the empirical details about the non-farm sector in Tanzania. The specific focus of this paper is on peri-urban areas around six urban centers in the country. As the data do not cover all rural areas in Tanzania, the paper does not generalize to rural areas as a whole. However, it is often assumed that non-farm activities in rural areas emerge first in peri-urban areas rather than in more outlying regions. To the extent that this is true, this paper may offer some pointers to the impact of an expansion of non-farm activities to more outlying areas of rural Tanzania. We will comment further on the perception that peri-urban areas provide the natural setting in which to search for evidence on the scale and significance of the rural non-farm economy.

The paper is organized as follows. In the next section we provide a brief overview of the non-farm sector in Tanzania. We also inquire into the possible role of social capital, in its various guises, in stimulating or discouraging this sector of the rural economy. Section 3 describes the data analyzed in the paper. Section 4 describes the empirical findings from the analysis, and Section 5 concludes.

The non-farm sector in Tanzania

Ellis (1999) provides a recent review of the large-scale sample survey evidence on the significance of the non-farm sector in rural Tanzania (Table 1). Although there are serious problems of comparability and interpretability in the figures reported in Table 1, several points are worth noting. First, in rural Tanzania non-monetized incomes remain quite important, suggesting that the transition out of subsistence agriculture is far from complete. Second, non-farm income shares are fairly low and there is no clear evidence of a marked expansion of these shares over time. (Note that the figures for 1991 reported in the last column of Table 1, run contrary to the bulk of qualitative and quantitative evidence on Tanzanian rural households in the 1990s, in which non-farm incomes tend to be considerably more important than the figure of 10.8% suggests. Ellis (1999) suggests that non-farm incomes were possibly particularly poorly measured in the sample survey from which the 1991 figures derive.) Third, non-farm wage income appears not to have been a very large source of rural incomes in Tanzania during the past 30 years, suggesting the absence and

¹ Liedholdm et al. (1994) and Reardon (1997) provide recent surveys of empirical work in rural Africa.

² See also Lanjouw and Lanjouw (2001) for a survey of the empirical and theoretical literature on the non-farm sector.

Table 1
Composition of rural household incomes from large size household surveys^a

	1969 (%)	1976/77 (%)	1980 (%)	1983 (%)	1991 (%)
Subsistence	43.9	49.2	49.0	44.9	35.2
Farm cash	24.3	18.8	27.5	17.6	54.0
Crops	17.3	16.8	14.1	10.3	50.5
Livestock	7.0	2.0	13.4	7.2	3.5
Nonfarm cash	31.8	32.0	23.5	37.5	10.8
Wages	12.7	7.5	n.a.	6.4	5.5
Business	16.9	22.2	19.5	26.3	4.2
Remittances	2.3	2.4	4.0	4.8	1.1
Total income	100.0	100.0	100.0	100.0	100.0

^a Source: Ellis (1999).

little development of rural labor markets (both agricultural and non-agricultural). The bulk of non-farm incomes tend to come from business activities.

Recent research on rural poverty in Tanzania has highlighted the importance of social capital as a major determinant of well-being in rural areas (see, for example, Narayan and Pritchett, 1997). The relationship between social capital and the performance of the rural non-farm sector is less well understood. The early work by Putnam et al. (1993) argues that “norms and networks of civic engagement” are a precondition for good government and economic development. However, one can imagine that social capital’s influence on non-farm development need not always be positive. Narayan (1999), for instance, notes that the same formal and informal ties that bind and help members also exclude and alienate others. To the extent that non-farm development requires the establishment of rather more distant, anonymous, commercial relationships than what is usual in a rural subsistence-cultivation setting, this could prove a handicap. Strong social networks may also dampen individual initiative and curtail the entrepreneurial spirit by posing excessive claims on successful group members. In this paper we offer some tentative evidence on the question of whether and to what extent, different types of social capital influence non-farm activities in peri-urban areas of Tanzania.

Data and setting

The empirical analysis is based on the 1998 Tanzania Peri-Urban Survey, fielded in the peri-urban areas around Dar es Salaam, Lindi, Mbeya, Mwanza, Arusha and Moshi. Data was collected from 592 households in roughly 50 villages in the 2 months between 27 February and 10 April 1998. The survey collected information on household incomes and their sources, employment in farm and non-farm activities,

socio-economic and other constraints to these and other activities, availability and use of basic services (e.g., education, health, agricultural extension), food consumption expenditures, social capital, and private asset ownership and structure.³

Setting

One of the main sources of variation in this paper relates to the different types of peri-urban areas that we are able to examine. The six cities around which our data were collected are located in different parts of Tanzania, and represent very different types of urban economy. A major constraint in this analysis lies in our limited ability to describe in detail the urban economy to which each respective peri-urban area pertains. Data on city size, for example, are not available. Indeed, it is even difficult to establish whether “urban” is defined consistently in Tanzania.⁴ Table 2 provides some basic information on the regions within which the six cities are located, and describes the setting in which our peri-urban households are found. The table demonstrates considerable heterogeneity across cities. Dar es Salaam, the region in which Tanzania’s capital is located, had a population of nearly 1.4 million people at the time of the 1988 census. Population density in this region is very high, suggesting that the region as a whole can possibly be viewed as urbanized at least to some degree. Census data suggest that the region experienced a considerable amount of in-migration in the period up to 1988, indicating a high degree of economic dynamism relative to the regions covered in the survey. Indeed, in the period 1980–94, the Dar es Salaam region accounted for about 20% of Tanzania’s GDP. Social indicators in Dar es Salaam suggest that the region does not match its economic dominance over the other five regions with better social outcomes. In urban areas, infant mortality and under five mortality figures are worse than at least three of the regions surveyed (Mwanza, Moshi and Arusha). Nor does Dar es Salaam clearly stand out on either male or female literacy rates.

Mwanza, in the north of Tanzania is a much larger region. The total population is nearly 2 million, but population density in the region is less than one-tenth of that in Dar es Salaam. It is clear that urban areas represent only part of the region (in fact, only 22% of the population of this region lives in urban areas). In contrast to Dar es Salaam, net migration flows have been negative in this region, and the GDP contribution of the region is a more modest 8%. Moshi (Kilimanjaro) and Arusha are two neighboring regions near the Kenyan frontier. The total population in each of the two regions is a little over 1 million but with an overall population density in Arusha only about one-fifth that in Moshi. While net migration to Moshi was negative in the period prior to the 1988 census, net flows to Arusha were positive. This is possibly the consequence of economic opportunities in the latter region associated with its proximity to many of Tanzania’s famous wildlife reserves and other

³ The data on which this study draws have been more widely analyzed recently by the World Bank (1999) and that study also provides greater detail on the design and fielding of the peri-urban survey.

⁴ The definition of peri-urban adopted here was specific to the survey; urban centers were identified, and peri-urban areas were defined on the basis of being within a 20 km distance from the city perimeter.

Table 2
Basic characteristics of the six survey regions^a

Regions	Total population (1988), rural and urban	Population per square kilometer	% of urban population (available for selected regions only)	Net lifetime migration	Contribution to GDP (1980–94)	Life expectancy at birth (1988): male	Life expectancy at birth (1988): female	Infant mortality rate (1988): IMR/1000 (urban)	Under 5 mortality rate (1988): U5MR/1000 (urban)	Male literacy rates in urban areas (population aged 10 years and older, 1988)	Female literacy rates in urban areas (population aged 10 years and older, 1988)
Dar es Salaam	1,360,850	976.9	N/A	500,621	20.33	50	50	103	169	90.0	77.7
Mwanza	1,878,271	93.5	22	-33,504	7.67	46	50	97	158	83.7	66.9
Moshi	1,108,699	83.7	N/A	-124,724	3.67	57	62	73	115	90.3	83.6
Arusha	1,351,675	16.5	N/A	141,724	7.80	57	58	72	114	91.8	82.8
Mbeya	1,476,199	24.5	14	-46,999	6.00	45	48	107	177	87.5	70.4
Lindi	646,550	9.8	15	-49,831	2.00	46	48	121	204	75.9	60.2

^a Source: Tanzania Planning Commission: Regional Socio-Economic Profiles (1997).

tourist attractions. This dynamism is reflected in Arusha's sizable contribution to national GDP of 7.8%, in sharp contrast to Moshi's 3.7%.

Mbeya, in the south of Tanzania on the Zambian border, has a total population just under 1.5 million, but a low population density and an urbanization rate of only 14%. The region contributed 6% to the Tanzanian GDP and experienced net migration outflows in the period preceding the 1988 census. The last region to be covered in the survey is Lindi, which like Dar es Salaam lies along the coastline in the east of Tanzania. This is the smallest of the regions in terms of population, with a correspondingly low population density. Only some 15% of the population is urbanized. The region is quite underdeveloped, contributing only 2% of GDP. Its lack of economic dynamism is also likely reflected in the negative net migration to the region in the period prior to the 1988 census.

Lindi also stands out among the six regions covered by the survey as having particularly poor social indicators, and stands in sharp contrast to Arusha and Moshi which rank highest in terms of life-expectancy, health and literacy. Interestingly, Mbeya also ranks quite poorly in terms of life expectancy and health indicators, but changes rank with Mwanza with respect to education outcomes.

Our quick overview of the six regions covered by the survey suggests that the most economically dynamic regions are Dar es Salaam and Arusha, with the latter also boasting particularly high human capital and other social outcomes. The poorest of the regions appear to be Lindi and Mbeya. We will look at the quantitative evidence below to ascertain whether patterns of non-farm activity in the peri-urban areas of these regions also in some sense correlate with these broad aggregates.

Empirical findings

Non-farm incomes

Table 3 provides a breakdown of income by source in the whole survey as well as separately in the six peri-urban areas of the cities covered by the survey. In the six peri-urban regions combined, non-farm incomes represent 24% of total incomes. This percentage can be broken down into 18% deriving from business activities and around 5% from non-agricultural wage labor activities. Crop income, combining subsistence with marketed agricultural output, represents 54% of incomes in these peri-urban areas. The remainder is made up of livestock and livestock products income (16%), hunting, gathering and fishing (8%), farm labor and other sources (3% and 1%, respectively). An important finding, and one which contrasts with that reported in Table 1 for all rural areas, is that net remittance incomes are on balance negative, as on average 6% of income is sent out of these peri-urban areas.

Breaking the survey down into the respective peri-urban areas we observe considerable variation in the importance of non-farm incomes across regions. In the region of Dar es Salaam, non-farm incomes represented as much as 32% of total incomes. Dar es Salaam is a coastal city, and this is reflected in the fact that hunting and gathering (fishing) is more important than average. Of the non-farm incomes in

Table 3
Income shares by source and city

	Per capita income	Per capita food consumption	Non-farm income (%)	Farm income (%)	Net remittance (%)			
Survey	198,356	84,413	24	81	-6			
Dar es Salaam	272,660	125,824	32	62	4			
Mwanza	234,079	76,933	15	91	-7			
Moshi	155,205	71,358	8	77	15			
Arusha	298,101	77,234	24	87	-11			
Mbeya	88,695	45,957	24	102	-26			
Lindi	70,855	48,952	11	82	7			
	Business (%)	Non-farm labor (%)	Crops (%)	Livestock and livestock products (%)	Hunting and gathering (%)	Farm labor (%)	Other (%)	
Survey	18	4	55	15	8	3	1	
Dar es Salaam	28	3	32	9	20	1	1	
Mwanza	8	6	59	22	3	5	2	
Moshi	5	3	54	18	1	3	1	
Arusha	8	15	34	49	0	3	1	
Mbeya	20	4	87	10	1	3	2	
Lindi	9	2	69	3	5	6	1	

Dar es Salaam, the largest proportion (28/32=88%) comes from business activities, while only 3% of total incomes come from non-farm wage labor. Interestingly, households in the peri-urban areas of Dar es Salaam appear on average to remain net recipients of remittance incomes.

The other peri-urban areas in which non-farm incomes represent an important share of total income are Arusha and Mbeya. While the dominance of business activities is once again observed in Mbeya (83% of all non-farm incomes come from business activities), wage labor in the non-farm sector is particularly important in Arusha (accounting for 63% of non-farm incomes). As mentioned above, Arusha is located in the vicinity of Tanzania's major safari parks. It is possible that employment in the tourist industry which is centered in this region provides a significant boost to household incomes in the surroundings of this city.

The relatively high reliance in Mbeya on non-farm incomes, particularly business incomes, merits some additional comment. Non-agricultural activities can be broadly divided into two groups of occupations: high labor productivity/high income activities and low labor productivity activities which serve only as a residual source of employment — a “last-resort” source of income (Lanjouw and Lanjouw, 2001). These latter activities are common among the very poor, particularly among women, and earnings are often very low. One possibility is that while in both Dar es Salaam and Mbeya non-farm business income is an important contributor to total income, the actual types of activities engaged in are quite different, with non-farm business activities in the former region serving as a route towards upward mobility but serving as a more residual source of income Mbeya. Another possibility is that relatively few households engage in non-farm business activities in Mbeya but earn particularly high incomes from these, thereby lifting the average contribution of business activities to overall incomes (which are otherwise low) in the region.

A limitation of our data is that we are unable to scrutinize the precise nature of the specific business activities which are undertaken, but scrutiny of non-farm income shares across food-consumption quintiles, suggests that the latter conjecture is more likely to hold (Table 4). While the poorest quintile (over the entire sample of households) receives some 6% of household income from non-farm sources, the percentage is as high as 37% for the top quintile. For non-farm activities the strongest correlation between income shares and consumption quintiles occurs for business activities. For wage labor activities the relationship is non-monotonic, which could imply that at least some of the wage labor non-farm activities are poorly remunerated and serve as a residual activity for poor households which would otherwise be even poorer.

Although comparability of definitions is unlikely to be perfect, the evidence in Table 3 suggests that, for the survey as a whole, non-farm income shares in peri-urban areas are not significantly higher than in rural areas more generally. (Recall that in Table 1 income shares were observed at around 20–30% through the 1970s and 1980s, but were estimated at only 10.8% in 1991. This latter estimate has been argued by Ellis, 1999, to be unreliable.) It is sometimes argued that one should expect to see more evidence of non-farm activities in areas around major conurbations given the, presumably, better access to infrastructure and markets in such areas. At least

Table 4
Income shares by food consumption quintile

Quintile (1=poorest)	Per capita income	Per capita consumption	Non-farm income (%)	Farm income (%)	Net remittance (%)
1	30,833	21,528	6	99	-5
2	100,599	41,360	8	97	-5
3	207,875	66,230	22	74	-1
4	261,871	93,249	30	70	0
5	393,402	198,396	36	70	-7

Quintile (1=poorest)	Business (%)	Non-farm labor (%)	Crops (%)	Livestock and livestock products (%)	Hunting and gathering (%)	Farm labor (%)	Other (%)
1	2	3	81	10	1	7	0
2	5	2	79	14	2	2	1
3	15	6	46	15	11	2	3
4	22	7	40	17	11	2	2
5	32	4	34	19	16	2	0

two reasons could be put forward as to why this need not be the case. First, it is possible that proximity to a large market for food products provides an incentive to households in peri-urban areas to retain an involvement in the production of food — especially perishable items that cannot be easily transported over large distances. Second, and relatedly, it is possible that given the proximity to urban centers of production, rural households consume urban-produced non-agricultural goods and services rather than produce them locally. This pattern of relatively low non-farm sector involvement in peri-urban areas has also been observed by Lanjouw (1998) in the case of Ecuador.

The data on agricultural production in the Tanzania Peri-Urban Survey offer some support to the above arguments. First of all, the data indicate that crop sales account for about 40% of the value of gross agricultural output in these peri-urban areas. This is higher than the figures in Table 1 generally suggest for rural areas as a whole, where subsistence agriculture is most common (the exception is in the final year column of Table 1). Second, the bulk of crop sales are food items (86% of crop sales are food). Third, there is a clear evidence in the data that those households located closest to the cities not only sell more food as a fraction of all crop sales (92%), but also produce a considerably larger proportion of perishable goods such as fruit, than households located further away.⁵

Table 5 focuses specifically on the relationship between income shares and distance from conurbations. Again we have an indication that non-farm income shares are not noticeably higher in peri-urban areas than in rural areas as a whole, as non-farm shares do not rise with greater proximity to conurbations. The share of non-farm incomes in the lowest distance strata is 15% while it is as high as 36% in the 10–15 km strata around the cities. Another interesting finding is that net remittances are positive in the stratum closest to the cities, while they are negative in all other strata.

The determinants of non-farm employment probabilities

In order to examine the contribution of a significantly wider range of explanatory variables, we turn to a multivariate analysis of non-farm employment in the peri-urban areas of Tanzania. We start by estimating a probit model of the probability that an individual is engaged in a business or non-farm wage activity. We then estimate a reduced-form income regression, to try to draw out the influence of the explanatory variables on earnings from the non-farm sector.

We consider four sets of explanatory variables, each corresponding to different level of aggregation. Individual-level variables describe the gender, age, and education level of the individual. Household-level variables, include the dependency ratio (ratio of dependents to working family members); a variable indicating whether

⁵ The proportion of fruit sales out of total crop sales is 22% in the case of households located 0–5 km away from the cities, declining to 16% for those at a 5–10 km distance, 9% for those at 10–15 km distance and 1% for those 15–20 km away.

Table 5
Incomes shares by distance strata

Distance strata	Per capita income	Per capita consumption	Non-farm income (%)	Farm income (%)	Net remittance (%)
0–5 km	215,517	71,199	15	82	2
5–10 km	197,672	92,747	24	82	-7
10–15 km	141,642	70,941	36	82	-18
15–20 km	105,723	50,864	17	94	-12

Distance strata	Business (%)	Non-farm labor (%)	Crops	Livestock and livestock products (%)	Hunting and gathering (%)	Farm labor (%)	Other (%)
0–5 km	9	6	57	17	5	3	1
5–10 km	19	4	49	24	6	2	2
10–15 km	32	3	60	15	1	6	2
15–20 km	5	11	82	7	4	1	1

the household head migrated to this area, and per capita land holding of the household. The latter variable might not usually be perceived as exogenous, but in rural Africa land markets are often poorly functioning, and generally quite thin, so that an assumption of exogeneity may not be so unacceptable in this case.

At the village level we include indicators of access to a telephone and to an asphalted road. The percentage of village households engaged in non-agricultural activities is meant to capture the extent to which the peri-urban village has diversified out of agriculture. Total available village land per capita captures the extent of population pressure in the village. The average reported village farm wage proxies the profitability of agriculture in the village.

We construct a number of village level measures of social capital, rather than a single composite index of this variable. The survey interviewed respondents on different dimensions of social capital, including: (a) their membership in non-family groups and the characteristics of these groups (i.e., the number, heterogeneity, inclusiveness, size and activity of the groups); (b) the number of hours per month spent on village communal activities; and (c) their perception of village cohesion (scored from 1=great conflicts to 5=extremely united). We constructed a single village-level index for each of these items. For items (b) and (c), we averaged the responses of households in the same village to obtain village-level measures of community involvement and village unity, respectively. Combining elements of item (a) involved constructing numerical indices for each characteristic of a group to which a household belonged, weighting by the amount of time spent by the household with each group, calculating an average characteristic group score for the village and multiplying this by the average number of groups/societies in the village.

Respondents were also asked to rate their level of trust in 12 different types of individuals, from family members to strangers. The trust scores were computed relative to the rating the respondent gives for his/her own closest kin. We then calculated the average trust scores for the following groups: (1) fellow tribesmen and traditional healer (trust a); (2) local, district and central officials, including service providers (trust b); and (3) strangers and non-village traders (trust c).

The final set of variables are dummies representing the particular peri-urban region and another set of dummies indicating the distance stratum to which the household belongs. It is clear that interacting these dummies with all or several of the other variables would have been extremely interesting; experiments in this direction were not satisfactory due to the relatively small sample size of the data at hand. For this reason we report only the results in which these dummies act as shift variables.

Table 6 presents the probit model of the probability of involvement in business activities. The results are presented in terms of the marginal effects associated with each explanatory variable. These can be interpreted as indicating the effect of a percentage change in the explanatory variable on the probability of involvement in non-farm business activities, taking all other variables in the specification at their means.⁶ Standard errors have been adjusted to account for clustering in the sample.

⁶ For dummy variables, the marginal effect is calculated as the change in the dependent variable

Table 6
Probability of involvement in non-farm activities

Variable	Business activities		Non-farm labor	
	Estimate	Probability value	Estimates	Probability value
Female	-0.10	0.00	-0.02	0.00
Age	0.05	0.00	0.01	0.00
Age squared	-0.001	0.00	-0.0001	0.00
Primary education	0.06	0.00	0.009	0.28
Secondary and higher	0.04	0.22	0.10	0.00
Dependency ratio	-0.0007	0.94	-0.003	0.36
Land owned per capita	-0.03	0.03	0.003	0.69
Land owned squared	0.002	0.05	-0.001	0.39
Electricity in village	-0.04	0.01	0.02	0.10
Asphalt road	0.06	0.05	-0.01	0.11
% Household in non-farm activity	-0.11	0.12	-0.04	0.16
Village per capita land	0.005	0.66	-0.002	0.52
Wage farm field work	0.00003	0.23	0.00003	0.09
Non-family groups/societies	0.02	0.00	0.002	0.51
Community involvement	-0.01	0.06	-0.02	0.00
Village unity	-0.0003	0.97	-0.002	0.62
Trust a	-0.04	0.03	-0.01	0.09
Trust b	0.05	0.00	0.02	0.00
Trust c	-0.005	0.78	-0.01	0.03
Dar es Salaam	0.17	0.00	-0.02	0.14
Mwanza	0.04	0.24	0.03	0.06
Moshi	-0.0009	0.98	-0.004	0.76
Arusha	-0.02	0.41	-0.01	0.27
Lindi	0.10	0.00	0.01	0.69
Distance 1 (0–5 km)	0.03	0.18	0.02	0.18
Distance 2 (5–10 km)	0.03	0.27	0.002	0.91
Distance 3 (10–15 km)	0.04	0.15	0.01	0.53
No. of observations	1572		1572	
χ^2 (27)	1285.06		584.61	
Prob $> \chi^2$	0.0000		0.00	
Pseudo R^2	0.2169		0.227	
Log likelihood	-533		-221	

The relatively few cases of non-farm wage employment in the data results in a less successful model of employment probabilities than business activities.

Examining first the individual-level explanatory variables, Table 6 indicates that women have a lower probability of involvement in non-farm activities than men,

associated with a move from a value of 0 for the dummy, to 1, holding all other variables constant at mean values.

keeping all other variables at mean values. For business activities the probability is 10 percentage points lower, and for wage labor it is 2 percentage points. Non-farm employment probabilities increase with age, up to a maximum age in the 40s, beyond which the probabilities decline. Education is important for both business and wage activities. However, for non-farm business primary schooling is key, while wage employment probabilities are significantly related to education when secondary schooling levels have been reached.

Larger household per capita landholdings reduce the probability that an individual is involved in the business sub-sector. This suggests that business activities are perceived as an alternative to cultivation — large landowners are more likely to engage in agricultural activities than are small landowners. Beyond per capita landholdings of around 8.8 ha, the negative relationship disappears and larger landholdings are associated with a higher probability of business activities. Access to an asphalt road increases the probability of business sector involvement by 6 percentage points. Access of the village to electricity has a negative effect on business involvement, but a (weakly significant) positive impact on wage employment. The coation between non-farm activities and infrastructure, especially roads, is a consistent finding across numerous empirical studies (Lanjouw and Lanjouw, 2001)

Increased population pressure in the village does not appear to influence significantly the probability of non-farm activity, possibly because the majority of the areas defined as peri-urban villages in the survey are still quite rural in character. As such, limits on tillable land in these areas are not yet too evident. The greater the proportion of households in the village that are involved in agriculture, the lower is the probability of a village household's involvement in business activity. However, this last relationship is only weakly significant.

The greater the number and quality of village social groups, the higher is the probability of an individual's partaking of non-farm (business or wage-labor) activity. However, this probability decreases as the average time spent in communal activities increases, possibly because time and other responsibilities required for being involved in such activities can be at odds with the demands that stem from villagers' high participation rates in their communal activities. Village cohesion is not a significant factor. However, while village-level trust in officials and other public servants encourages non-farm activity, greater village-wide trust in fellow tribesmen appears to discourage this. The latter is perhaps because strong affinities towards fellow tribesmen can increase claims and reliance on successful members, or exert pressure against individual members getting ahead. To the extent that we are able to capture different dimensions of social capital, our results suggest that their impact on non-farm diversification can be quite different.

Finally, the regional level variables indicate that the probability of involvement in business sector activities is significantly higher in the peri-urban areas of Dar es Salaam relative to Mbeya, our omitted region. This is not the case for non-farm wage activities. A somewhat surprising finding is that controlling for all other variables, non-farm business sector activities are also more likely in the other coastal city of Lindi. After controlling for other characteristics, wage employment probabilities are (weakly significantly) higher in Mwanza.

Consistent with our earlier observations regarding the rather weak association between non-farm incomes and proximity to urban center, the distance variables do not provide any additional explanatory power in our models of the probability of non-farm business or wage activities.

The determinants of non-farm employment incomes

We turn now to an examination of non-farm incomes as opposed to probability of involvement. To avoid difficulties associated with censoring of our dependent variable at zero we employ a censored least absolute deviation model (CLAD) of non-agricultural incomes on a set of explanatory variables (for an exposition of this approach see Deaton, 1997). We estimate a quantile regression on the full sample of households (both with zero and non-zero non-agricultural incomes), predicting non-agricultural income on the basis of the parameter estimates, dropping those households for which predicted non-agricultural income is negative, re-estimating the quantile regression and then repeating the exercise with multiple iterations, until no more negative predicted values are obtained. We then calculate bootstrapped standard errors on the parameter estimates.

In Table 7 we examine earnings from non-farm business activities and from employment. Business incomes are significantly higher for men than for women; a man would expect to earn about 60 times as much as a woman.⁷ The dramatically lower expected non-farm earnings for a woman than for a man with otherwise the same characteristics, are the result of the combination of factors: (i) the lower probability of becoming involved in non-farm activities in the first place (the percentage of working-age women involved in non-agricultural business is less than half that of men); (ii) shorter employment spells, (iii) employment in different activities; and (iv) possibly lower returns for a given job. Our inability to control for the time spent in business and wage employment implies that most of the variation in earnings from non-farm activities is likely attributable to variations in time spent in these occupations.

Business earnings rise with age up to a maximum of around 40 years and rise sharply with primary, but not secondary, education. An additional percent of the village population employed in non-farm activities lowers earnings by almost 10 percentage points, suggesting that increased competition in the non-farm sector would strongly reduce additional earnings. Population density reduces earnings: an additional hectare of land per person in the village doubles earnings from business activities. Social capital does not seem to have much effect on business earnings, except for community involvement which lowers earnings. A simple explanation could be that time spent on communal activities is time lost for private business.

Of the regional variables, only the Arusha dummy is significant, suggesting that

⁷ A coefficient c multiplying a dummy variable can be interpreted as a percent change in the endogenous variable only as long as c is close to zero. For larger values, in absolute terms, the percent change in the endogenous variable is given by $100[\exp(c)-1]$.

Table 7
CLAD estimates of log non-farm incomes per person

Variable	Business activities		Non-farm employment	
	Estimate	Probability value	Estimate	Probability value
Male	4.08	0.00	9.96	0.00
Age	2.74	0.00	1.78	0.00
Age squared	-0.04	0.00	-0.02	0.00
Primary education	3.26	0.00	4.98	0.03
Secondary and higher	0.20	0.90	11.65	0.00
Dependency ratio	-0.93	0.15	-1.67	0.02
Land owned per capita	0.001	0.99	1.64	0.24
Land owned squared	-0.04	0.42	-0.40	0.22
Electricity in village	0.48	0.70	4.70	0.01
Asphalt road	0.31	0.92	-5.68	0.09
% Household in non-farm activity	-9.59	0.10	-17.62	0.04
Village per capita land	0.99	0.03	-4.03	0.00
Wage farm field work	0.002	0.16	0.01	0.03
Non-family groups/societies	0.78	0.18	0.36	0.71
Community involvement	-1.00	0.04	-6.98	0.00
Village unity	-0.35	0.61	1.48	0.37
Trust a	-1.05	0.30	-10.46	0.00
Trust b	1.30	0.21	10.37	0.00
Trust c	-0.41	0.63	-2.39	0.12
Dar es Salaam	2.40	0.29	-0.88	0.82
Mwanza	-0.99	0.51	17.43	0.00
Moshi	0.90	0.72	-5.20	0.35
Arusha	-5.06	0.06	-9.79	0.04
Lindi	0.73	0.73	6.86	0.05
Distance 1 (0–5 km)	3.23	0.01	16.66	0.01
Distance 2 (5–10 km)	2.18	0.14	6.16	0.22
Distance 3 (10–15 km)	3.36	0.06	8.56	0.07
Intercept	-47.09	0.00	-54.43	0.00
No. of observations	1316		978	
Pseudo R^2	0.1283		0.1446	

controlling for all other factors, non-farm business incomes in peri-urban Arusha are much lower than in Mbeya (the omitted regional dummy). The distance dummies suggest that business incomes do not differ much within a range of 15 km from the city, but that they are much lower when non-farm business activities are located further out than 15 km.

Table 7 also indicates dramatically higher earnings for men than women from non-farm wage income. Earnings rise with age up to a turning point of 42 years. The impact of schooling in this model is dramatic: primary schooling is associated

with total earnings some 140 times higher than for the non-educated. Secondary schooling impacts are even greater. Once again, as the model measures total annual earnings, the returns to education observed are thus not only in terms of wage rates, but also in terms of employment spells.

As the average reported wage for farm field work increases, so do the earnings of non-farm work. This effect seems obvious if we interpret field work earnings as an indication of the non-farm minimum wage level in the village. Electricity supply seems to be very important for non-farm labor. Living in a village with access to electricity does not only increase the probability of non-farm wage employment, it also strongly increases non-farm wage labor earnings.

The same appears to be true for the degree of trust in officials and institutions. Communal activities, on the other hand, have negative effect on earnings. Here the interpretation of the coefficient is somewhat troublesome due to an endogeneity problem, as one would expect that high returns to non-farm wage labor will decrease the incentive for communal work.

At the regional level there appear to be large differences in labor incomes, controlling for other effects. In Mwanza and Lindi earnings are substantially higher than in Mbeya. In Arusha, on the other hand, income from non-farm wage labor is much lower than in Mbeya, once other characteristics are controlled for. In this model, wage labor earnings in the 0–5 km stratum are significantly higher than in the omitted distance variable representing the furthest outlying stratum, suggesting that the high income activities are located mainly near the urban areas. Although distance did not seem to matter in the probability models, the evidence suggests that incomes are typically higher closer in to the city centers.

Implications for policy

Our analysis has drawn a picture of the non-farm sector in peri-urban areas of Tanzania, which does not appear to be particularly deeply rooted and dynamic. Overall, non-farm incomes shares are not unambiguously higher than in rural areas as a whole. Only in peri-urban areas of the relatively dynamic urban centers of Dar es Salaam and Arusha, does the sector appear important in both income shares as well as absolute levels. One often looks to peri-urban areas first for signs of diversification out of agriculture. We have suggested, however, that this is an important empirical question which merits additional investigation. Our evidence suggests that peri-urban households are well-placed to concentrate on the production of agricultural goods, which can be readily sold in the city market place, and as a result agricultural incomes continue to be important to these households. Research on the non-farm sector in general has often noted that the agriculture and non-agriculture sectors tend to grow together, and our evidence suggests that this holds true in peri-urban areas as well.

Non-farm income shares rise sharply and monotonically with quintiles defined in terms of per capita food consumption. In that sense the sector appears to offer an important route out of poverty. This is particularly visible in the case of

business activities. Non-farm wage labor activities are apparently more heterogeneous, combining well-remunerated salaried occupations with low paying casual jobs, and these income shares are consequently less differentiated between the poor and non-poor.

While an expansion of non-farm activities is desirable, the evidence suggests the possibility of only limited access for a large fraction of the rural population. Our analysis suggests that policy makers should note the close relationship between non-farm incomes, on the one hand, and education, and infrastructure, on the other. It is also of concern that women appear to be poorly placed vis à vis the non-farm sector, even after controlling for education, age and other characteristics.

Does social capital matter for non-farm opportunities and earnings? Our evidence is partial and at best suggestive. What seems clear is that some forms of social connections and trust are more important than others for non-farm rural development. While kinship and tribal affinities, and time devoted to communal activities, appear to deter entrepreneurial activity and non-farm employment, trust in officials and public servants and strong heterogeneous village associations seem to be important in stimulating non-farm activity.

Acknowledgements

We are grateful to Hans Hoogeveen, Charles Kenny, Jean Olson Lanjouw, Tom Reardon, Shahid Yusuf and two anonymous referees, for helpful comments and suggestions. The views in this paper should not be taken to reflect those of the World Bank or any of its affiliates. All remaining errors are our own.

References

- Deaton, A., 1997. *The Analysis of Household Surveys: A Microeconomic Approach to Development Policy*. The World Bank, Washington, DC.
- Ellis, F., 1999. Non-farm employment in Tanzania: a partial case study. Mimeo, Natural Resources Institute, Chatham, UK.
- Lanjouw, P., 1998. The rural non-farm sector in Ecuador and its contribution to poverty reduction and inequality. Policy Research Working Paper, Development Economics Research Group, The World Bank, Washington, DC.
- Lanjouw, J.O., Lanjouw, P., 2001. Rural non-farm employment: an update. *Agricultural Economics*, in press.
- Liedholdm, C., McPherson, M., Chuta, E., 1994. Small enterprise employment growth in rural Africa. *Journal of Agricultural Economics* December, 1177–1182.
- Narayan, D., Pritchett, L., 1997. Cents and sociability: household income and social capital in rural Tanzania. World Bank Policy Research Paper, The World Bank, Washington, DC (forthcoming in *Economic Development and Cultural Change*).
- Narayan, D., 1999. Bonds and bridges: social capital and poverty. Policy Research Paper, The World Bank, Washington, DC.
- Putnam, R., Leonardi, R., Nanetti, R., 1993. *Making Democracy Work: Civic Traditions in Modern Italy*. Princeton University Press, Princeton, NJ.

- Reardon, T., 1997. Using evidence of household income diversification to inform study of the rural non-farm labor market in Africa. *World Development* 25 (3).
- Reardon, T., Stamoulis, K., Balisacan, A., Cruz, M.E., Berdegue, J., Banks, B., 1998. Rural nonfarm income in developing countries: importance and policy implications. In: *The State of Food and Agriculture 1998*. Food and Agriculture Organization of the United Nations, Rome.
- World Bank, 1999. Tanzania: peri urban development in the African mirror. Report No. 19526-TA, The World Bank, Washington, DC.