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Cities and Rural Transformation

A Spatial Analysis of Rural Youth Livelihoods in Ghana

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ABSTRACT

Urbanization has had a major impact on livelihoods in Ghana and throughout Africa as a whole. However, much research on urbanization has focused on effects occurring within cities, while there is insufficient understanding of its effects on rural areas. This paper examines the impact of urbanization—through a typology of districts—on rural livelihoods in Ghana. The country's districts are classified into seven spatial groups according to the size of the largest city in each district in southern and northern Ghana. The paper does not address rural–urban migration but instead focuses on the livelihoods of rural households. In contrast to the extensive literature focusing on the effects of urbanization on individuals, we assess its impacts on individual rural households as a whole, with a particular focus on youth-headed households. Many rural households have shifted their primary employment from agriculture to nonagriculture, especially in the more urbanized South. In contrast, change in livelihood diversification within rural households with family members' primary employment in both agriculture and nonagriculture appears much less rapid. Rural youth-headed households are significantly more associated with the transition away from agriculture than households headed by other adults, and such trends are stronger in locations closer to larger cities, particularly in the South. Although the nonagricultural economy is becoming increasingly important for rural households, contrary to expectations, the probit model analysis in this paper shows that agricultural production does not appear to be more intensified—in terms of modern input use—in the more urbanized South, and youth do not show greater agricultural technology adoption than other adults, indicating that the constraints against modern input adoption may be binding for all farmers, including youth and farmers in more urbanized locations. We also find that rural poverty rates are consistently lower among nonagricultural households, and the share of middle-class population is also disproportionally higher among rural nonagricultural households than agricultural households. While the probit analysis confirms the positive relationship between being a nonagricultural household and being nonpoor or becoming middle class after controlling for all other factors, education seems to play the biggest role. As rural youth become more educated and more households shift from agriculture to the rural nonfarm economy, a different range of technologies for agricultural intensification is necessary for agriculture to be attractive for youth. A territorial approach and related policies that integrate secondary cities and small towns with the rural economy deserve more attention such that the diversification of rural livelihoods can become a viable alternative or complement to rural–urban migration for youth.

Keywords: urbanization; youth employment; rural nonfarm economy; rural household livelihoods; Ghana

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1. INTRODUCTION

Ghana has been rapidly urbanizing in the past two decades. The 2010 Population and Housing Census revealed that for the first time more than half of the population lived in the country's urban areas. However, urbanization in Ghana has not followed the normal historical pathway for the economic transformation of an agrarian country. In China, and much of Asia, urbanization typically followed a period of substantial growth in agricultural productivity (the Green Revolution) that, among other things, freed up labor to move into the urban sectors. At the same time, rapid growth in labor-intensive industries, especially export manufacturing, offered productive jobs to workers leaving agriculture (Timmer 1988; Mellor 1976; Rosegrant and Hazell 2000). The pattern of transformation in Ghana is quite different. Ghana has undergone neither a Green Revolution (Nin-Pratt and McBride 2014) nor an industrial revolution (Jedwab 2013), yet urbanization has nonetheless been rapid. A similar phenomenon has been observed for many African countries (Headey, Bezemer, and Hazell 2010; McMillan and Rodrik 2011). This rapid urbanization has also raised concerns among policymakers about the potential effects of the exit of youth from agriculture and an aging agricultural labor force on production and productivity. With rapid urbanization as a backdrop, this paper assesses the level of the exit from agricultural employment, to what extent youth are participating in it, and its effects on the rural nonfarm sector.

It is important to situate the youth employment discussion within the broader context of urbanization. Much of the literature surrounding urbanization and its effects on the rural nonfarm economy builds off the classic Harris and Todaro (1970) framework, in which higher potential returns encourage labor to move from less productive rural agriculture to more productive urban manufacturing. According to that theory, increases in agricultural productivity also create a push effect that complements the pull of urban manufacturing in influencing rural–urban migration. The rural nonfarm economy also develops as a result of agriculture–consumption linkages driven by rising farm incomes (which may either drive urbanization by releasing labor from agriculture or result from it as urban sectors absorb excess rural employment and open up land for the remaining farmers)—particularly through increases in informal trade and local food processing (Haggblade, Hazell, and Brown 1989). Through all these factors working together, it can be expected that urbanization would lead to poverty reduction and a more vibrant economy in rural areas. Ravallion, Chen, and Sangraula 2007) show that this has occurred on aggregate in all regions except for Africa south of the Sahara, where there is no evidence of a strong association between urbanization and rural poverty reduction overall. However, such trends may have recently developed in many African countries, potentially those with strong economic growth performance and at relatively more advanced stages of economic transformation, including Ghana (Kolavalli et al. 2012).

Ghana has always been relatively urbanized compared with other African countries. This is partially due to the postindependence expansion of the cocoa sector (Jedwab 2013) and the promotion of state-owned industry in the later 1960s and early 1970s (Ackah, Adjasi, and Turkson 2014). By 2010, Ghana's urban population—defined as people living in settlements of more than 5,000 people—surpassed 50 percent of total population for the first time (GSS 2013). While Accra and Kumasi, Ghana's two megacities, continue to attract migrants, the growth of secondary cities and rural towns has also contributed to Ghana's urbanization in recent years.

Although Ghana has become a middle-income country and has been considered an African success story, urbanization in Ghana appears associated with primarily commodity exports rather than labor-intensive export-oriented manufacturing as observed in much of Asia. Cocoa, gold, and oil accounted for about 80 percent of Ghana's exports in 2013, while manufacturing growth has been minimal (Aryeetey and Baah-Boateng 2015). Such a case of urbanization without industrialization typically leads to the rise of "consumption cities" dominated by employment in nontradable services (Gollin, Jedwab, and Vollrath 2016). Therefore, urbanization in Ghana may not be able to generate sufficient manufacturing employment, although employment in informal urban services may still be an alternative to rural poverty. As such, development of the rural nonfarm economy, which can also be driven by urbanization, may be especially important for growth and poverty reduction in Ghana. In a

previous study in northern Ghana, Owusu, Abdulai, and Abdul-Rahman (2011) show that diversification of farm households into nonfarm work is associated with higher income and greater food security.

Therefore, rather than simply focusing on the distinction between rural and urban areas in understanding the impact of urbanization on Ghana's economic transformation, we focus on the proximity of rural areas to different sizes of cities to assess the linkages between urbanization and rural economic structural change. Similar to Berdegue et al. (2015) in Latin America, we group districts in Ghana by the size of their largest city into four categories: those with no city, small (third-tier) cities, medium (second-tier) cities, and metropolises (big cities). This is because other studies have found a population threshold below which cities do not have a major impact on the rural nonfarm economy while large metropolises exert much larger impacts (Berdegue et al. 2015; Deichmann, Shilpi, and Vakis 2009). An alternative method to capture the effect of proximity to cities on rural areas would be to measure urban gravity by the light intensity emanating from urban areas reaching rural villages, as Binswanger et al. (2016) do for Kenya; however, the required panel data are not available for Ghana.

Ghana has a well-defined South–North divide, which, among other things, reflects spatial differences in agroecological conditions, population density, rural infrastructure, and levels of urbanization. We therefore need to take this South–North divide into consideration when analyzing spatial heterogeneity associated with cities of different sizes. We will return to the South–North spatial classification in the next section.

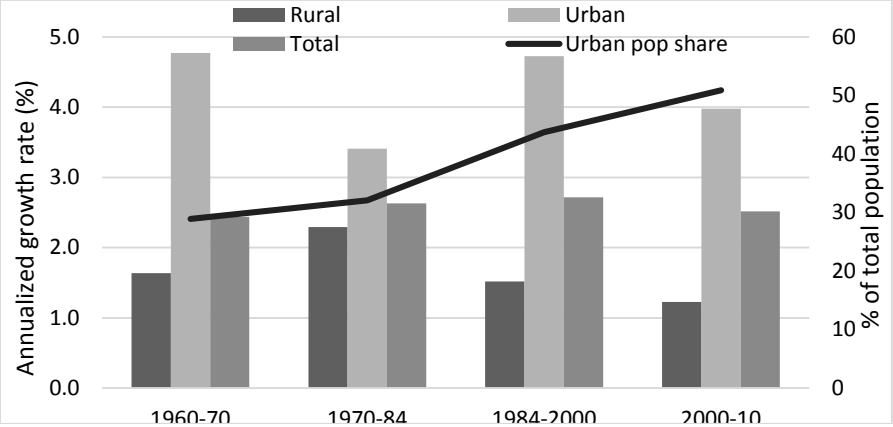
Focusing on the geographical divide and spatial heterogeneity associated with cities of different sizes, we analyze recent trends in rural household livelihoods in Ghana. Unlike other similar analyses, we focus on employment at the household rather than the individual level. We do this to distinguish between changing patterns of employment that involve entire households shifting sectors and diversification into both agricultural and nonagricultural employment within a household. We use data from the two rounds of Ghana's Population and Housing Census in 2000 and 2010 (Census 2000 and Census 2010) along with the two rounds of the Ghana Living Standards Survey conducted in 2005–2006 and 2012–2013 (GLSS5 and GLSS6) in our analysis. We also assess the relationship between urbanization and agricultural intensification in addition to employment patterns in the rural nonfarm economy.

Specifically, we focus on four broad questions in the analysis. First, are patterns of rural employment changing with urbanization and do those changes have any spatial patterns associated with proximity to cities of different sizes? Second, what are the impacts of rural transformation on youth in the rural areas? Third, what are the impacts of urbanization on agricultural intensification? Finally, what are the welfare or income implications of the rural transformation that has created heterogeneous livelihood opportunities? In Section 2, we address the first two questions together. Section 3 turns to the third question and analyzes the relationship of urbanization and agricultural intensification. Section 4 addresses the fourth question and discusses the heterogeneous outcomes of poverty reduction and a rising middle class associated with patterns of rural livelihoods. Section 5 concludes with a few key policy implications.

2. CHANGING PATTERNS OF RURAL EMPLOYMENT AND ECONOMIC ACTIVITY WITH URBANIZATION

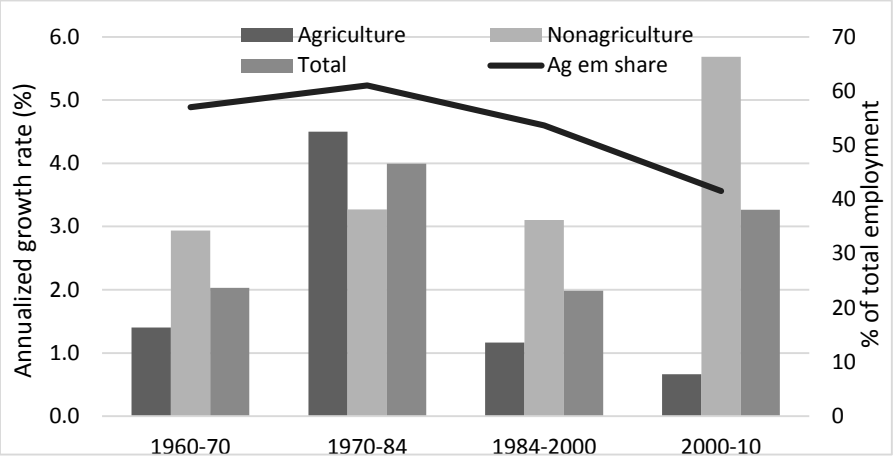
In Ghana, a steady rise in the share of the urban population has been accompanied by a rapid exit from agriculture. As Figure 2.1a shows, the urban population growth rate is consistently more than triple the rural population growth rate, except during the period of poor economic growth under the import substitution strategy between 1970 and 1984. Meanwhile, the share of agriculture in total employment also drops, down to 41.6 percent in 2010 according to Census 2010. In 2000–2010, the growth rate of agricultural employment falls to below 1 percent, or about half the rural population growth rate, while the growth rate of nonagricultural employment rises from 3 percent to above 5 percent (Figure 2.1b). This indicates that while urbanization is a major component of the exit from agriculture in Ghana, it is also associated with an expansion of the rural nonfarm economy.

Figure 2.1a Inter-census population annual growth rate and urban population share in census years



Source: Authors' calculation using data from the five rounds of censuses (GCO, 1964; 1975. GSS 1989; 2003; 2013).
Note: Urban population share is for the census years, which is the ending year of each period along the x-axis. pop = population.

Figure 2.1b Inter-census employment annual growth rate and agricultural share of total employment in census years



Source: Authors' calculation using data from the five rounds of censuses (GCO, 1964; 1975. GSS 1989; 2003; 2013).
Note: Share of agriculture in total employment is for the census years, which is the ending year of each period along the x-axis. em = employment.

While there is significant migration to cities, rural households also appear to be shifting their livelihoods away from agriculture. Nevertheless, agricultural gross domestic product (GDP) grew rapidly from 2000 to 2010, by 4.65 percent per annum measured at constant prices. With annual population growth of more than 2.5 percent, per capita agricultural GDP still grew at close to 2 percent per annum.

By focusing on the employment structure at the rural household level, we classify rural households into three types based on members' reported primary occupations in both the census and GLSS data: (1) rural households whose members' primary employment is in agriculture and that have no family members primarily engaged in nonagriculture, which we call "agriculture-only" households; (2) rural households of which all members' primary employment is in nonagriculture, which we call "nonagriculture-only" or "nonagricultural" households; and (3) households that have members with primary employment in both agriculture and nonagriculture, called "mixed" households. There is also a small percentage of rural households that do not report any primary employment (classified as "no-job" households) that are not covered in the analysis.

The household groupings are based on household members' primary employment, which does not imply that agricultural or nonagricultural households do not have incomes created outside their primary jobs. In fact, agricultural households commonly have nonfarm income from secondary employment or household enterprises, and many rural nonagricultural households also farm. The secondary employment in rural nonfarm activities and nonfarm household enterprises is highly seasonal and unlikely to be a household's main income source. Seventy percent of nonagricultural households that farm have cultivated land of less than 2 hectares, indicating that farming is a part-time activity for most such households. Based on the two census rounds and the two GLSS rounds, Table 2.1 provides the distribution of agricultural and nonagricultural households in the four different survey years. Using data from GLSS5 and GLSS6, the last two columns of Table 2.1 also provide percentages of agricultural and nonagricultural households that have income outside their primary jobs.

Table 2.1 Distribution of rural households by members 'primary employment in Ghana (column 1 through 4 sum to 100 in each survey year)

Survey	Survey year	Ag only	Nonag only	Ag and nonag mixed	No job	Ag with nonfarm enterprise	Nonag with cultivated farmland
		(1)	(2)	(3)	(4)	(5)	(6)
Census	2000	56.9	15.9	18.3	8.9		
GLSS5	2005–2006	58.3	19.7	15.7	6.3	14.6	9.6
Census	2010	51.1	25.0	17.2	6.7		
GLSS6	2012–2013	54.2	24.8	16.6	4.5	11.6	8.6

Source: Authors' calculation using data from Census 2000 and Census 2010 (GSS 2003, 2013) and GLSS5 and GLSS6 (GSS 2014).

Note: Household type is defined according to the household members' primary employment status; column 5 is part of column 1, and column 6 is part of column 2. Ag = agriculture; nonag = nonagriculture.

Table 2.1 shows the increases in the proportion of nonagricultural households in total rural households alongside a declining share of agricultural households over time according to both the census and the GLSS. Somewhat surprisingly, the share of mixed households increased modestly between the GLSS survey years and declined modestly between the two rounds of the census. Compared with the percentage of agriculture-only households in total rural households, shares of agricultural households with nonfarm enterprises are small and declined over time—14.6 percent versus 11.6 percent of total rural households in GLSS5 and GLSS6, respectively—(column 5 of Table 2.1). On the other hand the share of nonagricultural households with cultivated farmland is significant in 2005–2006; that is, 9.6 percent out of the 19.7 percent of rural households classified as nonagricultural households do farm. However, in 2012–2013, when the share of nonagricultural households increased to 24.8 percent, the percentage of such households with farmland actually fell (to 8.6 percent; column 6 of Table 2.1). Table 2.1 seems to

suggest a trend in which rural households in Ghana tend to be exiting agriculture altogether rather than diversifying within the household. This finding is somewhat puzzling given the extensive literature on intrahousehold diversification (Owusu, Abdulai, and Abdul-Rahman 2013).

Spatial Heterogeneity of Rural Employment Patterns

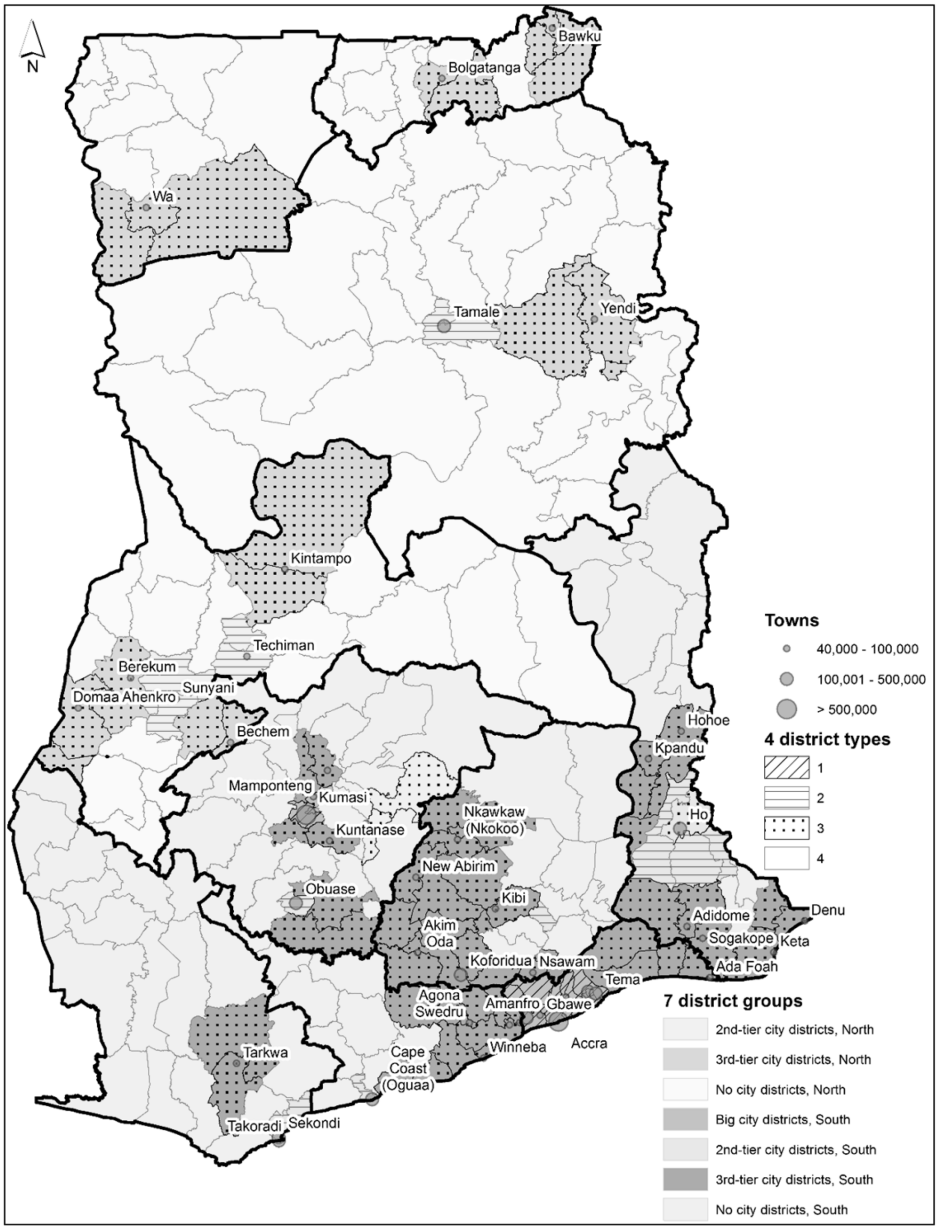
We now turn to the spatial heterogeneity of rural employment patterns. Ghana has a well-defined North–South divide, which, among other things, reflects spatial differences in agroecological conditions, population density, rural infrastructure, and levels of urbanization. We therefore first differentiate between two major regions based on both the North–South divide and agroecological conditions. We define the agriculturally dominant North, which comprises the regions of Brong Ahafo, Northern, Upper East, and Upper West, as the North. The North has a low population density that is relatively far from most large cities, and most of its rural households are predominantly engaged in farming. The North also corresponds closely to the Savanna and Transition agroecological zones. The remaining six regions—Ashanti, Central, Eastern, Greater Accra, Volta, and Western—are then grouped into the South, which is less reliant on agriculture, is more urbanized, has a higher population density, and has a more developed rural nonfarm economy. The South corresponds closely to the Forest and Coastal agroecological zones.

Like cities, most rural nonagricultural households are also concentrated in the six southern regions of Ghana. For the South as a whole, 30 percent of rural households are nonagricultural in 2010, increasing from 18 percent in 2000. While the North is much more agriculture dominant, the share of nonagricultural households also increases, but more slowly, from a lower base of 10 percent in 2000 to 13 percent in 2010.

Combining the North–South divide with the proximity to different-sized cities that are considered at the district level, we further define types of districts in both regions: (a) *big-city districts,* which contain cities of more than 500,000 people (such districts correspond to the cities of Accra and Kumasi and are therefore all located in the South); (b) *second-tier-city districts* whose largest cities have populations of between 100,000 and 500,000; (c) *third-tier-city districts* whose largest cities have populations between 40,000 and 100,000; and (d) *no-city districts,* in which there are no cities or towns with populations over 40,000. In summary, there are three district groups in the North (in which there are no big-city districts) and four in the South.

Figure 2.2 combines Census 2010 data and spatial data for cities to display the geographic locations of these seven groups of districts.

Figure 2.2 Ghana map showing the different types of districts



Source: The map was created by Mekamu Kedir Jemal (IFPRI), combining Census 2010 data with other spatial data including cities and road networks. City, town, and road network spatial data are from the University of Ghana's Remote Sensing and Geographic Info Systems website (accessed March 25, 2016, www.ug.edu.gh/rsgislab/rs-gis-geonode-app.html).

Although the South covers a much smaller land area than the North, Census 2010 shows that 73 percent of the country's total population and 63 percent of the rural population lives in the South. Moreover, the majority of the total population lives in districts with cities of at least 40,000 people in both types of regions, while about 40 percent of the rural population lives in such districts. Table 2.2 displays the distribution of rural households by the three groups among the seven types of districts. We ignore the small "no-job" group in the table.

Table 2.2 Distribution of rural households by agricultural, nonagricultural, and mixed occupations across district groups (each type of district's total rural households = 100)

District group	North ag only	Nonag only	Mixed	South ag only	Nonag only	Mixed
Census 2000						
Big-city districts				27.7	50.3	12.3
2nd-tier-city districts	53.8	18.2	20.3	38.3	32.4	14.9
3rd-tier-city districts	58.2	11.2	19.1	50.1	21.1	18.8
No-city districts	62.6	8.2	19.0	61.5	13.9	17.9
Regional total	60.9	9.7	19.1	55.3	18.4	18.0
Census 2010						
Big-city districts				9.0	74.1	6.6
2nd-tier-city districts	37.7	34.9	20.4	14.9	59.7	10.2
3rd-tier-city districts	63.7	14.5	17.8	39.4	34.1	17.4
No-city districts	67.5	10.5	18.6	53.4	23.0	17.0
Regional total	64.7	13.0	18.5	45.6	29.7	16.7
Difference 2010–2000						
Big-city districts				-18.7	23.8	-5.8
2nd-tier-city districts	-16.1	16.6	0.0	-23.4	27.4	-4.7
3rd-tier-city districts	5.5	3.2	-1.3	-10.7	12.9	-1.4
No-city districts	4.9	2.3	-0.4	-8.0	9.1	-0.9
Regional total	3.8	3.3	-0.6	-9.6	11.3	-1.3

Source: Census 2000 and Census 2010 data (GSS 2003, 2013).
Note: Households that did not report any primary job are not reported in the table; therefore, the sum of the three groups of households does not equal 100. Ag = agriculture; nonag = nonagriculture.

The share of nonagriculture-only rural households increased in all district groups in both the South and the North between 2000 and 2010, though most rapidly in the South and especially in the big-city and second-tier-city district groups. This was mirrored by an almost equivalent pattern of decline in the shares of agriculture-only rural households in the South and the district group with second-tier cities in the North. However, in the northern district groups that either have small cities or no cities, the share of agriculture-only households increased in this period. Thus, there has been a sizable shift of households from agricultural employment to the rural nonfarm economy in the South and in districts with relatively large cities in the North. In both South and North, the rural households' agriculture exit has been highly correlated with proximity to cities. Despite this exit, the share of rural agriculture-only households remain high in district groups without big and secondary-tier cities in both the North and the South, averaging 46 percent even in the South in 2010. Only in the rural areas surrounding relatively large cities did nonagriculture-only households constitute the majority of rural households in 2010.

There has been a modest but surprising decline in the shares of mixed-employment rural households across district groups in both the North and the South (Table 2.2). These are households where some members have diversified into primarily nonagricultural occupations while other members continue to work primarily in agriculture. Thus, although many rural households have switched their primary occupation entirely from agriculture to nonagriculture, a declining share of rural households are straddling the two sectors through their primary occupations. However, Table 2.2 is based on the census data, which does not capture secondary or part-time occupations. So it is possible that many more rural households have mixed livelihoods than shown in Table 2.2, although on a part-time basis.

The census data (not reported in Table 2.2) also indicate that the urban population is younger than the rural population, possibly due to migrants, who tend to be young. The mean and median ages of household heads also indicate that urban households tend to be headed by relatively younger men and women than head rural households, with a median age of 44 for rural household heads and 40 for urban

household heads. In rural areas, the median age of nonagricultural household heads is six to seven years lower than it is for agricultural household heads, although that was also the case in 2000. That is, there is not enough evidence to support the argument that rural household heads tend to be aging, at least not between 2000 and 2010, although growth in rural nonagricultural households over this period appears to be concentrated among relatively youthful households.

Consistent with the ages of household heads, we find that the trend of exiting agriculture is more prevalent among youth-headed households. The percentage of rural households headed by youths, which are defined as aged 15 to 34, seems to be stable at around 26 percent in both 2000 and 2010. In 2000, the majority of youth-headed households are still agricultural (53.8 percent), but in 2010, only 42.5 percent of youth-headed households are agricultural (Table 2.3, last row). Meanwhile, the share of agricultural households among all rural households headed by both youth and other adults remains above 50 percent in 2010, implying that the difference between youth-headed and total rural households in terms of share of nonagricultural households widens from 3 percentage points in 2000 to 8.6 percentage points in 2010. This trend seems to indicate that for the country as a whole, young households are leaving agriculture more rapidly than other rural households.

Table 2.3 Percentage of youth-headed agricultural and nonagricultural households in 2000 and 2010(

District	2000 Agriculture only	2000 Nonagriculture only	2010 Agriculture only	2010 Nonagriculture only
2nd-tier-city districts	55.4	22.5	30.6	45.4
3rd-tier-city districts	58.5	14.9	57.0	23.1
No-city districts	64.3	10.7	64.9	15.9
North total	62.2	12.7	60.3	20.0
Big-city districts	25.1	53.9	6.3	76.5
2nd-tier-city districts	30.4	38.2	9.1	64.1
3rd-tier-city districts	45.2	30.0	28.8	48.9
No-city districts	58.1	20.4	45.4	34.3
South total	51.1	25.9	36.4	42.5
National total	53.8	22.6	42.5	36.7

Source: Census 2000 and Census 2010 data (GSS 2003, 2013).

Note: The table does not include the percentages for youth-headed mixed households and youth-headed households that did not report any primary job; therefore, the sum of the two groups of youth-headed households does not equal 100.

However, this national trend does not necessarily hold at the regional level or across district groups classified according to proximity to different-sized cities; livelihood patterns for youth-headed households are expected to also exhibit significantly spatial heterogeneity. The majority of youth-headed households in the North are still agricultural, and the share falls only modestly from 62.2 percent in 2000 to 60.3 percent in 2010 (Table 2.3). On the other hand, in the South, where in 2000 more than 50 percent of rural youth-headed households were agricultural, that share drops sharply to 36.4 percent in 2010. Thus, the trend of rural youth-headed households leaving agriculture predominantly occurs in the South. Further analyzing the trends in the South shows that in 2010, except for the no-city district group, the number of nonagricultural households headed by youth is greater than the number of youth-headed agricultural households in the three southern district groups with cities. Thus, the exit of rural youth-headed households from agriculture appears to be influenced by proximity to larger cities in both the North and the South, but it is more prevalent across all types of districts in the South.

Factors Determining the Patterns of Rural Livelihoods

To further test whether the trends we observe in the data are statistically robust, econometric analysis using a probit model is conducted. In this analysis, we try to understand factors associated with the determinants of being a nonagriculture-only household in the rural areas as well as the changes that have taken place between two rounds of surveys. We pool the two census rounds (2000 and 2010) as well as rounds 5 and 6 of GLSS (2005–2006 and 2012–2013) for the analysis (that is, we do not mix census and GLSS data and have conducted the probit analyses separately using pooled census and pooled GLSS data). Pooling requires careful examination of the data, as important assumptions exist about the variances that need to be addressed. The following paragraphs discuss the implications of these two issues.

The binary nature of the dependent variable means that an ordinary least squares approach is not adequate, as it violates the assumption of normality and linearity and it is likely to generate fitted values that fall outside the bounds of zero and one. Out-of-range predictions mean that the inference being made is nonsensical. Probit models are especially well suited to deal with binary left-hand-side variables. With that in mind, we have estimated a series of probit regressions to investigate the effects of covariates of interest on the probability of a household being agricultural or nonagricultural.

Equation 1 provides a general specification of the probit models used throughout the paper:

$$y = \alpha + \sum \beta_i x + \varepsilon, \tag{1}$$

where y takes the value of 1 if the latent variable y^* is greater than zero, and zero otherwise. The estimation of y is conditional on observables. In equation 1, α is a constant, x is a matrix of covariates, β is a vector of coefficients to be estimated, and ε is an identically identified and distributed error term.

Pooling cross-section data may improve the accuracy of estimates because it increases the number of observations. By doing so, not only do degrees of freedom increase, but also the estimates benefit from the law of large numbers, which wash away deviations from normality and other issues. The result is increased accuracy. There is, however, a caveat to pooling cross-sections. It has to do with the fact that pooled estimations assume that the variances are homogeneous. Nonhomogeneous variances lead to group-wise heteroskedasticity (in our case by year), which, in turn, produces biased standard errors. Wooldridge (2012) discusses ways in which one can address these issues. The first step is to establish that variances are homogeneous in the datasets being pooled. This can be done by comparing the variances of the variables of interest and testing whether they are the same using Levene's robust test statistic for the equality of variances. If some variables have different variances, robust standard errors should be used to ensure that heteroskedasticity is addressed. Groupwise heteroskedasticity was not an issue in the estimations we have conducted in this paper, mostly because all but one of our right-hand-side variables are binary. Still, to placate fears of potential biases in the standard errors, we have also estimated the two rounds of surveys separately and tested the equality of coefficients. Results were consistent with the results obtained with the pooled dataset. For the sake of brevity, we do not report these results. Also, we discuss only the results using the pooled data of two rounds of the GLSS (see the appendix for the results of the pooled data analysis of the two rounds of the census).

We first discuss the effects of selected covariates on the probability of being a nonagricultural household. The covariates we have chosen are as follows: whether the household is headed by a young member (15 to 34 years old); a set of seven district-type dummies representing the levels of urbanization; a set of dummies for the household head's level of education; whether a household head is female; and a set of public-good variables at the community level. Since we have pooled two years of survey data, we also include a dummy variable (2012–2013 for GLSS6 in the pooled GLSS data and 2010 for Census 2010 in the pooled census data) and two interaction terms: a year dummy interacted with whether the household head is young, and a year dummy interacted with a gender variable. Besides the estimates for all rural households, we also conduct the estimation for youth-headed rural households and other-adult-headed rural households separately. In all the regressions for the three types of household (all, youth-headed, other-adult-headed), we compare nonagriculture-only households with the rest of rural

households as well as with agriculture/nonagriculture mixed households; that is, there are six regressions in total. We obtain both marginal effects and probit regression coefficients in all probit estimations. For brevity and simplicity, we display only the results for the marginal effects using the pooled GLSS data in Table 2.4.

In Table 2.4, columns a through c display the marginal effects of the probit estimation when the comparison group is all other rural households and the estimations are done for (a) all rural nonagriculture-only households; (b) the nonagricultural households headed by youth; and (c) the nonagricultural households headed by other adults. In other words, rural nonagricultural households are compared with all remaining rural households (agricultural, mixed, and so forth). The rest of the columns (d through f) report the marginal effects when the comparison group consists of only mixed rural households (that is, household members engage in both agricultural and nonagricultural activities as primary employment).

Starting with columns a through c, we observe an increase in the probability of being a nonagricultural household for the 2012-year dummy in the cases of all nonagricultural households and youth-headed households, but it does not hold for nonagricultural households headed by other adults. These results seem to indicate that in the process of urbanization, it is mainly youth-headed rural households that lead the transition from being agricultural to nonagricultural in 2005–2012, and the probability of such transition is not significant for the non-youth-headed other rural households. This result is further supported by the coefficients on the youth dummy and the interaction-between-year-and-youth dummy in the first column of Table 2.4, which indicates that being a youth-headed household is prominent in increasing the probability of being a nonagricultural household over time. The finding that youth-headed households have left agriculture more than other-adult-headed households is consistent with the descriptive analysis in the previous section.

Being a female-headed rural household also increases the probability of being a nonagricultural household in the pooled data in the first three columns. However, the interaction-between-year-and-gender-dummy is negative, implying that over time, gender becomes a less important factor in the explanation of being a nonagricultural household.

The estimation results for district group dummies are more consistent across districts in the South than in the North—that is, the marginal effect on the probability of being a nonagricultural household is 27.2 percent in the southern district group with a big city, while the probability is 7.75 percent and 7.40 percent, respectively, in the southern district groups with second-tier or third-tier cities, and it reduces further to 2.55 percent for the group of Southern districts without a city. On the other hand, in the North the coefficient is insignificant for the second-tier-city district group and is only weakly significant for the third-tier-city district group, indicating that proximity to cities seems to be less important for determining northern rural households to be nonagricultural. In the South, the consistent patterns of marginal effect hold also for youth-headed households, with the magnitude of the marginal effect being even larger, but they only hold for the big-city districts and the third-tier-city districts for the other-adult-headed households. Again, in the North, the coefficients of the district group dummies for youth-headed or other-adult-headed households are all insignificant. The estimation results for the district group dummies seem to indicate that it is the combination of the North–South divide and proximity to different-sized cities that determines the likelihood of being a nonagricultural household in the rural areas. Only in the more urbanized South could that proximity to larger-sized cities further increase the likelihood of being a nonagricultural household.

Table 2.4 Marginal effects of probit model regression on factors affecting being a nonagricultural household, pooled data of GLSS5 and GLSS6

	Comparing with the rest of households			Comparing with mixed households		
Independent variable	**All households**	**Youth-headed households**	**Other-adult-headed households**	**All households**	**Youth-headed households**	**Other-adult-headed households**
	(a)	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**
Year dummy for 2012–2013	0.0232**	0.0677***	0.00870	0.0205	0.0628**	0.000740
	(0.00921)	(0.0186)	(0.0102)	(0.0175)	(0.0250)	(0.0228)
Youth-headed households	0.123***			0.216***		
	(0.00908)			(0.0166)		
Female-headed households	0.150***	0.232***	0.132***	0.291***	0.349***	0.296***
	(0.00984)	(0.0215)	(0.0111)	(0.0182)	(0.0326)	(0.0231)
Year dummy × Youth	0.0487*			0.0552		
	(0.0209)			(0.0552)		
Year dummy × Gender	-0.0548***			-0.1038***		
	(0.0232)			(0.0355)		
Type of district group (base is no-city district, North)						
2nd-tier-city districts, North	0.0205	-0.0241	0.0382	0.0637	0.0845	0.0308
	(0.0417)	(0.0733)	(0.0458)	(0.0763)	(0.117)	(0.0929)
3rd-tier-city districts, North	0.0290*	0.0398	0.0194	0.0649**	0.0373	0.0790**
	(0.0161)	(0.0347)	(0.0170)	(0.0329)	(0.0509)	(0.0389)
Big-city districts, South	0.272***	0.470***	0.176***	0.261***	0.396***	0.180*
	(0.0428)	(0.0855)	(0.0494)	(0.0815)	(0.0928)	(0.108)
2nd-tier-city districts, South	0.0775*	0.254***	0.0145	-0.0353	0.130	-0.116
	(0.0409)	(0.0772)	(0.0482)	(0.0729)	(0.101)	(0.0980)
3rd-tier-city districts, South	0.0740***	0.143***	0.0462***	0.0367	0.0901***	0.0108
	(0.0129)	(0.0262)	(0.0140)	(0.0248)	(0.0344)	(0.0310)
No-city districts, South	0.0255**	0.0954***	-0.00721	0.00189	0.111***	-0.0577*
	(0.0117)	(0.0232)	(0.0130)	(0.0235)	(0.0326)	(0.0297)

Table 2.4 Continued

	Comparing with the rest of households			Comparing with mixed households		
Independent variable	**All households**	**Youth-headed households**	**Other-adult-headed households**	**All households**	**Youth-headed households**	**Other-adult-headed households**
	(a)	**(b)**	**(c)**	**(d)**	**(e)**	**(f)**
Education level ("no education" omitted)						
Primary completed	0.0802***	0.0720***	0.0780***	0.0545***	0.00719	0.0704***
	(0.0102)	(0.0204)	(0.0115)	(0.0196)	(0.0284)	(0.0256)
Secondary completed	0.213***	0.198***	0.214***	0.154***	0.0303	0.215***
	(0.0156)	(0.0283)	(0.0187)	(0.0287)	(0.0395)	(0.0371)
University and above	0.411***	0.560***	0.353***	0.385***	0.455***	0.396***
	(0.0445)	(0.125)	(0.0490)	(0.0677)	(0.105)	(0.0842)
Community variable						
Access to markets	0.0675***	0.0745***	0.0603***	0.0837***	0.0576**	0.0949***
	(0.0107)	(0.0218)	(0.0119)	(0.0198)	(0.0291)	(0.0255)
Access to public transportation	0.0556***	0.0799***	0.0461***	0.0407*	0.0398	0.0482*
	(0.0106)	(0.0219)	(0.0116)	(0.0217)	(0.0314)	(0.0278)
Access to electricity	0.0665***	0.112***	0.0434***	0.0538***	0.0687**	0.0403
	(0.0101)	(0.0196)	(0.0113)	(0.0199)	(0.0284)	(0.0260)
Observations	11,245	3,255	7,990	4,202	1,357	2,845

Source: Authors' own estimation using GLSS5 and GLSS6.
Note: The regressions include only rural households. * $p < 0.1$. ** $p < 0.05$. *** $p < 0.01$.

The sign and magnitude of the marginal effect in the probit estimation on the determinants of being a nonagricultural household for level of education are what we expect—that is, the more educated a head of household is, the higher the probability for that household to be nonagricultural, regardless of whether the head is young. This is also true for a set of variables representing the infrastructural conditions at the rural community level. Better access to markets, better access to public transportation, and better access to electricity each seems to contribute to increasing the likelihood of a rural household being nonagricultural, regardless of whether the household's head is young.

Moving to the second panel of Table 2.4, in which nonagricultural households are compared with the mixed group instead of with all the rest of households (that is, columns d through f), we see changes in the marginal effects of some selected variables. First, the significance of the year dummy for 2012–2013 disappears in the case for all households (column d) but holds for youth-headed households (column e) with a similar magnitude as in the first panel (column b). The marginal-effects patterns for youth and gender as well as for the year and gender interaction are the same between the two panels, although, consistent with the situation of the year dummy in the case for all households, the significance of the year and youth interaction disappears.

In only a few cases are the district group dummies fully consistent. However, the likelihood of being a rural nonagricultural household still increases in southern districts with proximity to cities, at least in the big-city and third-tier-city district groups (but not in the second-tier-city districts in the South). The stories for the effects of education and access to public infrastructure and markets are more or less the same, too, between the two panels for all households (column d). However, fewer variables become significant for youth-headed households in the second panel (column e), which could be associated with there being a smaller sample size—that is, fewer youth-headed households belong to the mixed group.

Structure of the Rural Nonfarm Economy

With rural youth increasingly being engaged in the rural nonfarm economy, it is important to further examine the patterns of rural nonagricultural employment. It is well known that recent nonagricultural employment growth in many African countries has occurred predominantly in the informal economy (McMillan and Rodrik 2011). This is also the case for Ghana, both in its rural and urban areas, in which 76 and 69 percent of employment, respectively, was informal according to Census 2010. We define the formal economy as the combination of the public sector (including international organizations and nongovernmental organizations) and the formal private sector (including foreign companies), and it is characterized by formal wage earnings. We define the informal economy as people working in their own businesses or as self-employed. The growth of nonfarm employment in rural areas may support the theory that as the influence of cities spreads to rural areas, those areas' employment structures begin to more closely resemble those of urban areas. As in urban areas, formal employment could also provide better and more reliable livelihood opportunities for rural workers, especially youth.

We classify all rural nonagricultural households into different nonagricultural employment categories according to all household members' engagement in the formal and informal economies. We classify a rural household as "formal only" if all the employed household members are employed in the formal nonagricultural economy. We classify households with family members working in both the formal and informal nonfarm economies as "formal/informal combined." Households with all employed members working in the informal nonfarm economy are classified as "informal only," which we break down further as informal manufacturing only, informal trade only, informal manufacturing and trade, and informal other (Table 2.5).

Table 2.5 Types of different nonagricultural households according to family members' employment

	Percentage of rural nonagricultural households with family members engaging in:					
	Formal only	Informal mfg only	Informal trade only	Informal mfg and trade	Informal other	Formal/informal combined
			2000			
North						
2nd-tier-city districts	30.1	10.5	21.6	4.3	9.7	23.7
3rd-tier-city districts	16.1	27.5	14.0	5.0	18.0	19.3
No-city districts	21.7	25.6	18.7	2.7	15.6	15.7
North total	21.0	24.4	17.6	3.6	15.6	17.8
South						
Big-city districts	27.7	6.3	15.5	2.9	13.0	34.5
2nd-tier-city districts	24.8	10.1	22.7	3.3	12.0	27.1
3rd-tier-city districts	19.4	16.2	23.6	4.9	13.7	22.1
No-city districts	23.6	16.8	22.1	4.1	12.5	20.9
South total	22.1	15.3	22.2	4.3	13.1	22.9
National total	21.9	16.9	21.4	4.2	13.5	22.0
			2010			
North						
2nd-tier-city districts	27.3	7.2	19.7	5.2	9.7	30.9
3rd-tier-city districts	26.3	12.1	19.3	3.2	15.1	24.1
No-city districts	24.5	16.7	22.9	3.8	11.1	21.0
North total	25.3	14.2	21.6	3.8	12.0	23.1
South						
Big-city districts	24.0	6.0	19.5	3.0	10.9	36.6
2nd-tier-city districts	26.4	7.8	21.5	2.6	10.2	31.5
3rd-tier-city districts	19.8	15.0	24.7	4.4	11.7	24.3
No-city districts	22.9	12.9	25.8	3.9	11.8	22.7
South total	21.5	13.2	24.6	4.1	11.7	25.0
National total	22.6	13.5	23.7	4.0	11.7	24.4

Source: Authors' calculation using data of Census 2000 and 2010 (GSS 2003, 2013).
Note: mfg = manufacturing.

As can be seen from Table 2.5, while the rural nonfarm sector is largely informal, 44 percent and 47 percent of rural nonagricultural households have at least one formal employee in 2000 and 2010, respectively. This is driven by employment opportunities in big-city districts and second-tier-city district groups where the majority of rural nonagricultural households would be able to engage in formal employment to a certain degree. On the other hand, the shares of formal employment are generally similar between the districts with small cities and without cities, indicating a lack of formal employment opportunities for the rural households in these areas.

For the rural nonagricultural households that engage in the rural informal economy, it seems that the majority of them engage in only one type of informal activity—either informal manufacturing or trade. Informal trade is more prevalent than informal manufacturing at the national level, particularly in the South, and more so in 2010 than in 2000. Essentially, rural manufacturing seems to be dominant in areas that are less urbanized and thus more isolated from the national market, likely because rural informal manufacturing primarily consists of food processing for the local market, which can take place at

the household level. Meanwhile, informal trade may signify the opposite, given that trade activities are associated with both agricultural and nonagricultural commodities to meet local demand in rural areas, reflecting greater connectivity with the broader economy. This reflects the findings of Haggblade, Hazell, and Brown (1989) and the literature on urban–rural linkages in general.

The Census 2000 data indicate that rural youth participating in nonagricultural employment engage in manufacturing activity more than other adults, as 31.3 percent of youth who are nonagricultural employees work in the manufacturing sector, while the share for other adults is only 24.2 percent. However, this difference between youth and other adults working in manufacturing disappears in 2010, when the youth share falls to a level similar to that of other adults at 24.8 percent. Given that local food processing is a major component of rural manufacturing, the youth exit from that subsector may also relate to their exit from agriculture. The share of youth employed in trade rises slightly between 2000 and 2010, from 30.7 percent to 33.7 percent, although the share of other adults in trade rises significantly from 30.2 percent to 40.9 percent in the same period.

Meanwhile, the mining sector is attracting a much larger share of youth although it represents a small share of employment overall, except in Western Region, where a gold mining boom has given rise to many small mining towns. On the national level, other adults are relatively more engaged in mining employment than youth, at 4.4 percent compared with 3.9 percent for youth, but that trend reverses in 2010, when mining accounts for 5.2 percent of rural youth employees versus 3.2 percent for other adults.

3. URBANIZATION AND AGRICULTURAL INTENSIFICATION

Urbanization has had important impacts on rural livelihoods, increasing the share of rural households engaged in the nonfarm economy. It has also contributed to an increase in the share of small, part-time farms in urbanized areas, and a shift toward more medium-sized farms in the agriculturally important areas of the North. The induced innovation hypothesis predicts that urbanization and associated increases in population density and market access should lead to more intensive farming practices, including the choice of technologies. We examine these relationships in this section.

The insights of the relationship between urbanization and the choice of technologies can be obtained by using regression techniques. We use a probit model to test how the probability of using different types of modern inputs is associated with urbanization, while controlling for a number of household and locational characteristics. Those characteristics include farm-size thresholds, household head characteristics (youth, gender, level of education), the degree of urbanization of the districts in which the households reside (using our district typology), and a set of infrastructural variables such as access to markets, access to public transportation, and access to electricity at the rural community level. In the regression, we include only the rural households in which agriculture is the primary occupation for all or some family members, since for most households defined as "nonagriculture-only" in the section above, any agricultural activity appears to be part-time.

As in Section 2, we have pooled data together from the two survey rounds—GLSS5 and GLSS6—in the regression, and hence we also include a year dummy for 2012–2013 (GLSS6), as well as the interaction terms for year and youth and year and gender in the regression. Still, there are too many missing variables in the regressions to test any causal relationships (for example, we cannot control for wages or missing household effects), but the regression results that are statistically significant do reveal some interesting patterns of association between urbanization and intensification, which we discuss subsequently. We report only the marginal effects of the probit estimation in Table 3.1.

Urbanization, as captured through our typology, has some significant but complex links with agricultural intensification. Rural households in all the three district groups in the agriculturally important North have a higher predicted probability of using fertilizer than households in the South, which may be driven by poorer soil fertility in the North. However, besides this agroecological factor for the North, the probit estimation shows that in the North, the higher the urbanization level—measured by the size of cities in different district groups—the higher the predicted probability of using fertilizer. For example, compared with households in the South's districts without cities, the predicted probability of using fertilizer increases by 25 percent in the North's districts with secondary cities, while the marginal effects are smaller in Northern districts with third-tier cities or without cities, at 18.7 percent and 13.9 percent, respectively. There is no such systematic relationship between the use of fertilizer and proximity to different-sized cities in the South.

The probit estimates show that the smaller the farm size is for a rural household, the less likely for it to use fertilizer. For example, the predicted probability of using fertilizer is 27.8 percent lower for households with less than 2 hectares of land compared with households with 20 hectares or more, but the probability is only 14.0 percent and 8.4 percent lower for those with 2 to 5 hectares and 5 to 20 hectares of land, respectively. The regression also shows a significant increase in the predicted probability of using fertilizer in 2012–2013 relative to 2005–2006, suggesting that a fertilizer subsidy introduced since 2007–2008 could be leading to more fertilizer use among all types of farm households.

In terms of education, the probit analysis shows that among farm households whose heads are more educated, particularly those completing secondary education, the probability of using fertilizer increases compared with the less educated ones. On the other hand, the dummy variable for youth-headed households only significantly affects the probability of fertilizer use through its interaction with the year dummy; this suggests that youth-headed households started having a higher probability of using fertilizer only in recent years.

The probit results for the use of herbicides/insecticides, the hiring of labor, and the use of mechanization are not always consistent with the results for fertilizer adoption, except for the relationships between farm size or education level of household heads and use of such inputs. That is, in general, the smaller the farm size, the less likely the household is to use herbicides/insecticides, to hire labor, and to use machinery. As with fertilizer use, the more educated the household head is, the higher the probability of that household using other modern inputs, hired labor, or mechanization.

While the predicted probabilities of fertilizer, herbicide/insecticide, and mechanization use are higher in 2012–2013, they are lower for hired labor use. From 2005–2006 to 2012–2013, the predicted probability of using herbicides/insecticides and mechanization increases by 34.6 percent and 14.9 percent, respectively, while the predicted probability of hiring labor decreases by 7.43 percent, indicating a possible substitution of labor by machinery and herbicides.

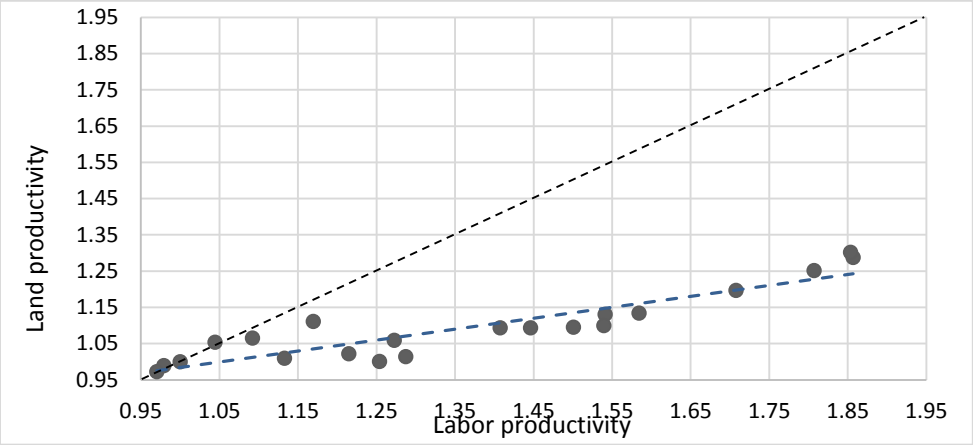
In the probit analysis, female-headed households have a lower probability of using modern inputs, which is consistent with many other studies (Quisumbing 1995). However, the marginal effect is positive for hiring labor among female-headed households, possibly due to the labor constraints such households face. The sign of the marginal effect for the youth dummy is not consistent and often insignificant in the regressions. This result is somewhat surprising, since younger farmers might be expected to be more open to new technologies and knowledge than older adults.

The marginal effect of urbanization on the use of other inputs is not always consistent with that for fertilizer use. Compared with no-city districts in the South, the marginal effect of using other inputs is mostly positive and significant only in second-tier-city districts in the North and big-city districts in the South. The sign of the marginal effect tends to be negative, if significant, for the other types of district groups in both the North and the South.

Among the three variables related to market access or public infrastructure, the marginal effect of input use is positive only for the access-to-public-transportation variable. The probability for any modern input use or labor hiring increases by 4.18 to 10.3 percent in the communities with easy access to public transportation, while market access seems to be positively associated only with hiring labor and the sign is negative for the use of other inputs. Market access is measured by whether a rural community has a daily or periodic market. It is also possible that better access to public transportation allows farmers to get access to markets through traders who can come to villages directly.

In summary for the focus on youth, while the regression results are unexpected, they at least seem to indicate that the constraints against modern input adoption could be binding for all farmers, including youth and farmers in more urbanized locations. Moreover, the results support the patterns of agricultural productivity growth observed from the macro data. As Figure 3.1 shows, Ghana's agricultural labor productivity has grown much faster than its land productivity. This tells us that recent agricultural growth in Ghana has been accompanied by more efficient use of labor without significant increases in land intensification. The continuous exit of youth from agriculture could further enhance this trend, indicating the importance of labor-saving technologies for agricultural intensification in Ghana.

Figure 3.1 Trends in land and labor productivity in Ghana, 1991–2011



Source: Authors' calculation using data from Timmer, de Vries, and de Vries (2015) for agricultural value-added and agricultural employment and from FAO (2016) for cultivated agricultural land.
Note: Each dot in the chart represents the year of the pair of the data.

Table 3.1 Marginal effects of probit model regressions on factors affecting agricultural input use, pooled data of GLSS5 and GLSS6

	(1)	(2)	(3)	(4)
Independent variable	**Fertilizer**	**Herbicides/insecticides**	**Hiring labor**	**Mechanization**
Farm size				
Less than 2 hectares	-0.278***	-0.147***	-0.223***	-0.286***
	(0.0461)	(0.0449)	(0.0501)	(0.0389)
2 to 5 hectares	-0.140***	-0.0236	-0.116**	-0.187***
	(0.0463)	(0.0447)	(0.0503)	(0.0388)
5 to 20 hectares	-0.0842*	0.0709	-0.00961	-0.0869**
	(0.0475)	(0.0462)	(0.0519)	(0.0399)
Base is > 20 hectares				
Type of district group				
2nd-tier-city districts, North	0.250***	0.174***	0.177***	0.0803**
	(0.0452)	(0.0522)	(0.0508)	(0.0383)
3rd-tier-city districts, North	0.187***	-0.172***	-0.0150	-0.000881
	(0.0184)	(0.0181)	(0.0205)	(0.0172)
No-city districts, North	0.139***	-0.0827***	0.0103	-0.00338
	(0.0138)	(0.0137)	(0.0154)	(0.0128)
Big-city districts, South	0.0217	-0.0730	0.180*	0.175**
	(0.107)	(0.109)	(0.103)	(0.0857)
2nd-tier-city districts, South	-0.00633	-0.159***	0.0604	-0.0807
	(0.0621)	(0.0587)	(0.0669)	(0.0630)
3rd-tier-city districts, South	-0.0693***	-0.0404***	-0.0254	-0.00712
	(0.0156)	(0.0150)	(0.0166)	(0.0140)
Base is no-city districts, South				

Table 3.1 Continued

Independent variable	(1) Fertilizer	(2) Herbicides/insecticides	(3) Hiring labor	(4) Mechanization
Year dummy for 2013	0.156***	0.346***	-0.0743***	0.149***
	(0.0108)	(0.00876)	(0.0124)	(0.00993)
Youth-headed household	0.00104	0.0234*	-0.0433***	0.00602
	(0.0134)	(0.0134)	(0.0147)	(0.0123)
Female-headed household	-0.0695***	-0.0842***	0.0612***	-0.0385***
	(0.0159)	(0.0155)	(0.0168)	(0.0144)
Year dummy × Youth	0.0596**	-0.0663**	-0.0200	0.0295
	(0.0266)	(0.0269)	(0.02904)	(0.0245)
Year dummy × Female	-0.00362	-0.0440	-0.0184	-0.0773**
	0.02845	(0.0286)	(0.0303)	(0.0261)
Education level				
Primary completed	0.0265**	0.0647***	0.0609***	0.0601***
	(0.0134)	(0.0131)	(0.0144)	(0.0121)
Secondary completed	0.0828***	0.0961***	0.0833***	0.0863***
	(0.0267)	(0.0276)	(0.0303)	(0.0241)
University and above	0.0130	0.352**	0.184	0.136
	(0.0894)	(0.148)	(0.142)	(0.143)
Base is no education				
Access to markets	-0.0335**	-0.0276*	0.0314*	-0.0278**
	(0.0145)	(0.0143)	(0.0161)	(0.0126)
Access to public transportation	0.0418***	0.103***	0.0769***	0.0904***
	(0.0125)	(0.0124)	(0.0138)	(0.0116)
Access to electricity	-0.00848	-0.0381***	0.0284**	-0.00746
	(0.0124)	(0.0122)	(0.0134)	(0.0116)
Observations	13,388	13,340	13,340	13,340

Source: Authors' own estimation using GLSS5 and GLSS6 data.
Note: Agricultural-only or agricultural-and-nonagricultural mixed rural households in GLSS5 are included in the regressions.
* $p < 0.1$. ** $p < 0.05$. *** $p < 0.01$.

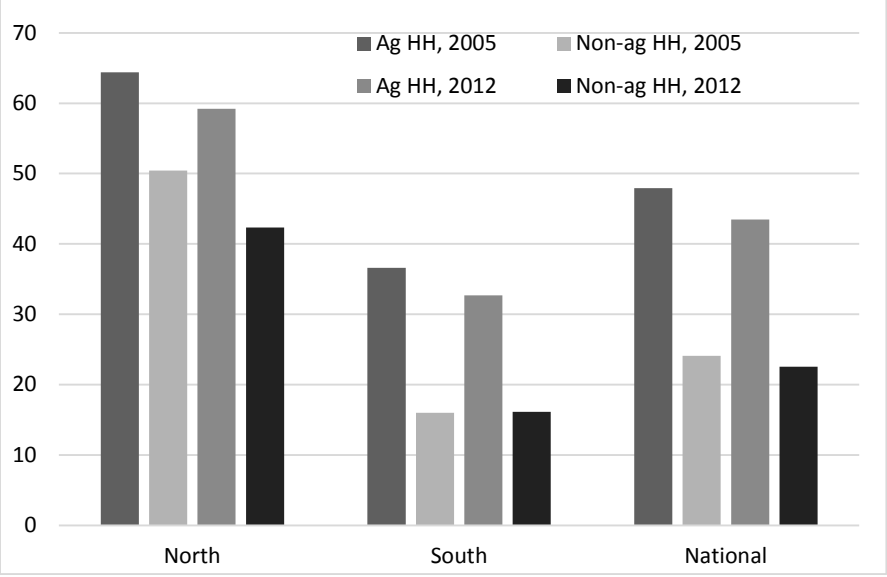
4. WELFARE OUTCOMES OF CHANGING RURAL LIVELIHOODS

Structural change in the rural economy often leads to rural poverty reduction. Indeed, the data show that rural youth-headed households appear to be in a better position to benefit from proximity to cities with more engagement in the nonagricultural economy. While the development of a vibrant rural nonfarm economy can serve as an alternative to migration to major cities, that depends on whether the changes in rural livelihoods can provide positive welfare outcomes. We therefore focus on the effects of the exit from agriculture associated with proximity to cities and rural nonfarm employment on poverty reduction. We analyze welfare outcomes using both poverty and middle-class measures calculated from the two rounds of the GLSS.

Measured by the national poverty line, the data show that the rural poverty rate is generally higher among agricultural households than nonagricultural households. This holds for the country as a whole and for both the North and the South. The poverty rate is much higher in the North than in the South, and within the North the difference in the poverty rate between the two groups of rural households is still considerably visible (Figure 4.1).

The national poverty rate for rural agricultural households is 48 percent in 2005, compared with 26 percent for rural nonagricultural households. While the poverty rate falls between 2005 and 2012 for both rural agricultural and nonagricultural households, the gap between them seems to be stable in the South but even wider in the North (Figure 4.1). This result displays the important role the rural nonfarm economy, particularly in the North, has played in reducing rural poverty. Moreover, the number of rural nonagricultural households increased while the number of rural agricultural households fell between the two rounds of the GLSS, which seems to further confirm the importance of the rural nonfarm economy in reducing rural poverty in 2005–2012.

Figure 4.1 Rural poverty rates for agricultural and nonagricultural households

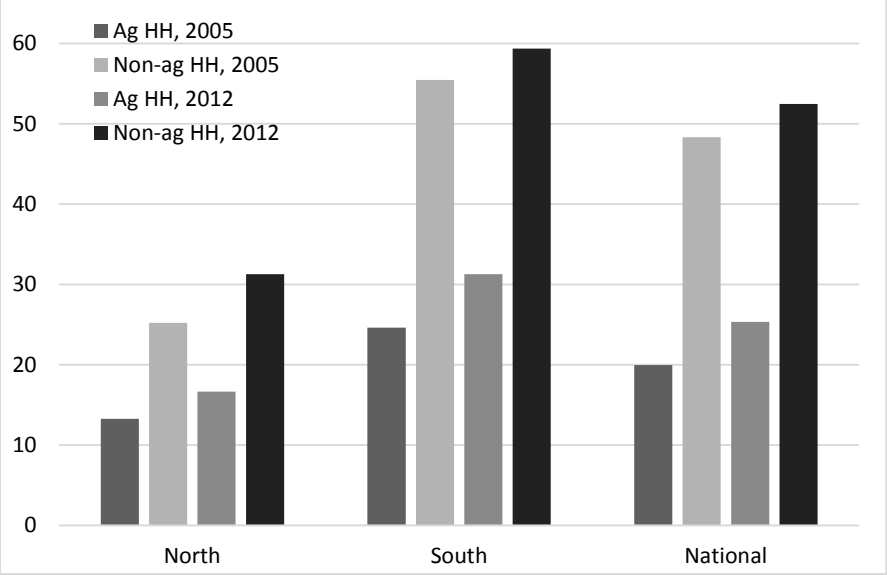


Source: Authors' calculation using data of GLSS5 and GLSS6 (GSS 2014).
Note: Ag = agricultural; HH = households; non-ag = nonagricultural.

We also want to examine whether rural nonagricultural households are ascending to the middle class at a faster rate than their agricultural counterparts. For that purpose, we calculate the proportion of rural households whose per capita income (proxied by expenditures) is $3.10 or above per day, a level of income that is often used to define the middle class in Africa (Banerjee and Duflo 2013; Ncube and Shimeles 2013).[1] Figure 4.2 presents the result. The difference in the share of middle-class households between agricultural and nonagricultural households is large throughout Ghana but more so in the South than in the North. In the North, fewer rural households belong to the middle class both for agricultural and nonagricultural households, which is expected given that the North is less developed and generally poorer than the South. However, as we see in Figure 4.2, the proportion of northern nonagricultural households' population that belongs to the middle class is similar to the proportion for southern agricultural households. This share rapidly increases from a low base for northern nonagricultural households, from 25 percent in 2005 to almost one-third in 2012, while the share for southern nonagricultural households increases slowly from a relatively high base (from 55.5 to 59.4 percent).

However, the absolute population of rural middle-class agricultural households is still more than the population of rural nonagricultural households in both the North and the South, even in 2012. This is because agricultural households are still prevalent in rural Ghana, although the middle-class population is disproportionately higher among nonagricultural households than among agricultural households.

Figure 4.2 Shares of middle-class population (with per capita income of $3.10 or more per day) in total population for rural agricultural and nonagricultural household groups



Source: Authors' calculation using data of GLSS5 and GLSS6 (GSS 2014).
Note: Ag = agricultural; HH = households; non-ag = nonagricultural.

Both Figures 4.1 and 4.2 can display only bivariate relationships between nonfarm activity and poverty rate levels or proportions of the middle class at the regional level. Again, further insights can be obtained by using regression techniques to unravel more complex multivariate relationships. As in Section 3, we use a probit model to test how the probability of being a nonpoor or a middle-class household is associated with participation in rural nonfarm employment as a household, and what other factors are associated with being a nonpoor or a middle-class rural household. For that purpose, in the

[1] The references define as "middle class" an individual living on between $2 and $10 a day. $2 is based on 2005 international prices, and the World Bank adjusts that to $3.10 based on 2011 international prices. In this paper, given that we focus only on rural households, we did not limit middle class by an upper income threshold.

regression in addition to a nonagricultural household dummy, we include dummies for youth-headed household, female-headed household, level of education, degree of urbanization of the district in which the household resides (using our district typology), and a set of infrastructural variables—access to markets, access to public transportation, and access to electricity at the rural community level—as a set of independent variables, all of which is similar to that in the probit model applied in Section 3. Again, we pool together GLSS5 and GLSS6; hence we include in the regression a year dummy for 2012–2013 and interact the year dummy with being a nonagricultural household, a youth-headed household, and a female-headed household. "Nonpoor" is defined as a household whose per capita expenditure is more than the national poverty line of $1.90 per day, and a "middle-class" household is one whose per capita expenditure is $3.10 or more per day. We focus only on the marginal effects of the regression, and Table 4.1 reports the results.

Table 4.1 Marginal effects of probit model regression on factors affecting being a nonpoor or a middle-class household in rural Ghana, pooled data of GLSS5 and GLSS6

Variable	Nonpoor versus poor	Middle-class versus other nonpoor	Variable	Nonpoor versus poor	Middle-class versus other nonpoor
	(1a)	(2a)		(1b)	(2b)
Nonagriculture-only household	0.0681***	0.118***	*Education level*		
	(0.0134)	(0.0167)	Primary completed	0.0671***	0.0351**
Year dummy for 2013	0.0163*	0.0525***		(0.0105)	(0.0149)
	(0.00925)	(0.0134)	Secondary completed	0.206***	0.167***
Youth-headed household	0.102***	0.0608***		(0.0219)	(0.0244)
	(0.0102)	(0.0139)	University and above	0.424***	0.337***
Female-headed household	0.0612***	0.0694***		(0.0638)	(0.0798)
	(0.0118)	(0.0160)	Base is no education		
Year dummy × Youth	-0.0353*	-0.0356	*Community-level variable*		
	(0.1914)	(0.02758)	Access to markets	-0.0109	-0.00991
Year dummy × Gender	-0.0577***	-0.02413		(0.0118)	(0.0168)
	(0.0217)	(0.0302)	Access to public transportation	0.0782***	0.0455***
Year dummy × Nonagricultural household	-0.0530**	0.02474		(0.0101)	(0.0160)
	(0.02447)	(0.03140)	Access to electricity	0.0660***	0.0298**
Type of district group (base is no-city districts, North)				(0.0101)	
2nd-tier-city districts, North	0.115***	0.0671			
	(0.0378)	(0.0509)			
3rd-tier-city districts, North	0.0236	0.00773			
	(0.0149)	(0.0278)	Number of observations	11,245	7,030
Big-city districts, South	0.209***	0.0473	F	78.82	35.98
	(0.0565)	(0.0741)	P-value	0	0
2nd-tier-city districts, South	0.169***	0.0666			
	(0.0538)	(0.0662)			
3rd-tier-city districts, South	0.175***	0.0459**			
	(0.0127)	(0.0199)			
No-city districts, South	0.168***	0.0498***			
	(0.0108)	(0.0182)			

Source: Authors' own estimation using GLSS5 and GLSS6 data.

Note: * p < 0.1. ** p < 0.05. *** p < 0.01.

We should first note that the data used in the regression for identifying factors that have an effect on being a middle-class household are a subset of the full sample, consisting of data for nonpoor rural households only. By excluding poor households from the regression, the data in the second regression should be more homogeneous than the full dataset; hence, we may expect the magnitude of the marginal effects of many variables affecting being a middle-class household to be smaller than those affecting being a nonpoor household. With that in mind, we actually find that the marginal effect of being a nonagriculture-only household on being a middle-class household is considerably stronger (11.8 percent) than it is on being a nonpoor household (6.81 percent), suggesting that nonfarm employment is not only important in reducing rural poverty but also important in ascending to the middle class. However, the sign of the coefficient is negative when the variable of being nonagricultural is interacted with the year dummy in the nonpoor-versus-poor comparison, and insignificant in the middle-class-versus-other-nonpoor comparison, indicating that the positive strong relationship between being a nonagricultural household and being nonpoor possibly weakens over time and that being a nonagricultural household is less time relevant for belonging to the middle class when more rural households become nonagricultural households.

We have already seen in Table 2.4 that the marginal effect of having a youth or female household head is positive for the probability of being a nonagricultural household. Table 4.1 further tells us that this effect is also positive on the probability of being nonpoor and in the middle class. However, in both cases and similar to the case of being a nonagricultural household, the sign of the coefficient is negative when these two variables are interacted with the year dummy in the nonpoor-versus-poor comparison and insignificant in the middle-class-versus-other-nonpoor comparison, which again seems to imply that the youth or gender factor is less time relevant, or at least not further strengthened over time.

The finding that being a female-headed household is positively associated with the probability of being nonpoor and with the probability of being in the middle class requires more attention, since that contradicts the conventional perception that female-headed households are more susceptible to poverty. Since our regressions control for variables such as livelihood source, education level, and proximity to a city, this result may be driven by other factors not captured in our regressions. Identifying those factors is beyond the scope of this paper, and therefore more research is important for fully understanding them.

We now turn to the location factor. As expected, location matters in the probability of being a nonpoor household. Compared with the no-city district group in the North, the marginal effect of the probability of being nonpoor increases in the second-tier-city northern districts and everywhere in the South; the coefficient is largest for the big-city district group in the South. However, the difference in probability of being nonpoor is insignificant between being in a no-city or small-city district in northern Ghana. For being a middle-class household, we see significance only for the coefficients of third-tier-city and no-city district groups in the South, while for all other district groups, the coefficients are insignificant. Possibly, among the nonpoor households in these districts, the nonpoor households are more homogeneous when their number (sample size) is small. Therefore, there is less variation among the households in such district groups, which leads to a lower level of significance.

The significant positive marginal effect for level of education on the probability of being nonpoor or becoming middle class is also expected, as well as the order of magnitude of the marginal effect. Moreover, we see an exponential increase in the value of the marginal effect when the level of education moves from primary to secondary and then to university. Compared with no education, having primary education only increases the probability of being nonpoor by 6.73 percent and of being in the middle class by 3.49 percent, while having a secondary and college education increases the probability of being nonpoor by 20.6 and 42.2 percent, respectively. Attaining those two levels of education increases the probability of being in the middle class by 16.7 and 33.7 percent, respectively.

Community-level infrastructure (but not market access) also plays a role in increasing the probability of being nonpoor and becoming middle class. The marginal effects of access to public transportation and access to electricity on the probability of being nonpoor are similar—7.78 percent versus 6.53 percent—and the magnitude of those marginal effects is smaller but still similar for being middle class, which is possibly due to a more homogeneous sample set in the latter case, as we explained earlier.

In summary, urbanization and city expansion seems to have important effects not only on poverty reduction but also on prospects for further moving up the income ladder for rural households that remain in rural areas and enter the rural nonfarm sector. Such effects are stronger in the more urbanized South, for youth-headed households, and especially for households whose heads are better educated.

5. CONCLUSION

The paper examines the impact of urbanization—measured by a typology of districts according to proximity to cities—on rural livelihoods in Ghana. We classify the country's districts into seven spatial groups according to the size of the largest city in each district in southern and northern Ghana. We do not address rural–urban migration but instead focus on the livelihoods of rural households in each of the seven district groups. We find that proximity to cities affects the patterns of rural employment for both individuals and households. Many rural households have shifted from solely agricultural employment to solely nonagricultural employment. Although such trends are observed across Ghana, they appear much stronger in the more urbanized South, which already had relatively higher shares of nonagricultural households than did the poorer, more agrarian North. Proximity to cities has a strong effect on the rate of exit of rural households from agriculture, which increases with the size of the city. Essentially, diversification in rural household livelihood in Ghana appears predominantly interhousehold, rather than intrahousehold in which some members are primarily employed in agriculture and others in nonagriculture. The proportion of this latter type of household in total rural households has changed little (between the two rounds of the GLSS) or fallen (between the two rounds of the census).

While the nonagricultural economy is becoming increasingly important for rural households, informality dominates the rural nonagricultural economy, as it does in urban areas. Informal trade and informal manufacturing (mainly agroprocessing) are the two most important sectors for creating rural nonfarm employment. Only in the rural areas close to Accra and Kumasi, as well as Western Region's mining boom areas, do more employment opportunities in the formal nonagricultural sector exist for the rural households. These results point to a number of policy implications. Informal nonagricultural activities often have closer ties to agriculture than formal ones, and their products and services are also mainly for satisfying local rural demand. In addition to rural–urban linkages that would create opportunities for agricultural growth and for rural employment through migration, it would be worthwhile to further explore agricultural growth opportunities through agricultural and nonagricultural geographic linkages in predominantly rural areas.

Importantly, rural youth appear to be significantly more associated with the transition away from agriculture than other adults both as household heads and individuals. Again, these trends are stronger in the locations closer to larger cities, particularly in the South. In fact, more than two-thirds of rural youth-headed households in the southern districts with large and second-tier cities have exited agriculture to become nonagricultural households in recent years. The probit regression analysis indicates that youth-headed households have a higher probability of working in nonagriculture than other adults after controlling for location and level of education. Such a likelihood increases further over time. As expected, the higher the education level a household head has, the higher the probability of being in nonagriculture regardless of being a youth-headed household or other-adult-headed household.

Along with the trends of rural households exiting agriculture, average farm size seems to increase, as more farmland becomes available to the households remaining in agriculture. While larger-scale farmers seem to have a higher probability of fertilizer use and adaptation of mechanization than smaller ones in the probit regression analysis, a consistent relationship between the level of urbanization (measured by our district typology) and adoption of fertilizer holds only in the North.

Although more youth appear to be exiting agriculture, the majority of young people in the locations without big or second-tier cities still work in agriculture. However, contrary to expectations, the results of the probit model do not show greater agricultural technology adoption among youth. In most cases, we find that the sign for the youth dummy is insignificant. While this unexpected result requires more research, as the existing data may not fully capture peri-urban agriculture, it at least seems to indicate that the constraints against modern input adoption may be binding for all farmers, including youth and farmers in more urbanized locations. Government policies and public investments that aim at promoting modern technology and agricultural commercialization could help both youth and other farmers overcome their common constraints.

We find that rural poverty rates are consistently lower among nonagricultural households. Moreover, the share of the middle-class population is disproportionally higher among rural nonagricultural households than agricultural households. The probit analysis shows a positive relationship between being a nonagricultural household and being nonpoor or becoming middle class after controlling for all other factors. Urbanization and rural infrastructure matter in reducing rural poverty and creating more middle-class rural households, particularly in the more urbanized South. However, education matters the most—especially higher levels of education.

Making agriculture attractive to the younger population requires increasing its profitability, which depends on modern technology adoption and agricultural intensification and commercialization. With more rural youth becoming more educated, and more rural households being expected to switch from agriculture to the rural nonfarm economy in the near future, a much different range of technologies would be required to make agriculture productive enough to be attractive. Additionally, deepening urbanization means that labor, land, and other capital markets are likely to become more integrated between rural and urban areas. Many nonagricultural policies that would indirectly affect agricultural performance could directly affect the attractiveness of agriculture for youth. A territorial approach and related policies that integrate secondary cities and small towns with the rural economy deserve more attention such that the diversification of rural livelihoods can become a viable alternative or complement to rural–urban migration for young people.

APPENDIX: SUPPLEMENTARY TABLES

Table A.1 Marginal effects in the probit estimations on the determinants of being a nonagricultural household, pooled data of Census 2000 and Census 2010

Independent variable	Comparing with the rest of households			Comparing with mixed households		
	All households	Youth-headed households	Other-adult-headed households	All households	Youth-headed households	Other-adult-headed households
Year dummy for 2010	0.0123	0.0243	0.00867	0.0154	0.0310**	0.0114
	-0.0144	-0.0151	-0.0144	-0.0172	-0.0146	-0.0194
Youth-headed households	0.0746***			0.170***		
	-0.00489			-0.0064		
Female-headed households	0.126***	0.151***	0.107***	0.196***	0.224***	0.194***
	-0.00747	-0.00796	-0.00665	-0.00894	-0.00873	-0.0104
Year dummy × Youth	0.0250***			0.0418***		
	-0.0057743			-0.00557		
Year dummy × Gender	0.0353***			0.0435***		
	-0.00736			-0.00897		
Type of district group (base is no-city district, North)						
2nd-tier-city districts, North	0.0933**	0.0867***	0.0901*	0.120***	0.124***	0.110***
	-0.0472	-0.0305	-0.0465	-0.0366	-0.0231	-0.0414
3rd-tier-city districts, North	0.0375	0.0431	0.0358	0.0726	0.0700*	0.0678
	-0.0419	-0.0438	-0.0401	-0.0567	-0.0405	-0.0623
Big-city districts, South	0.279***	0.230***	0.234***	0.286***	0.223***	0.341***
	-0.0424	-0.037	-0.0331	-0.0343	-0.026	-0.0408
2nd-tier-city districts, South	0.137***	0.0958***	0.143***	0.199***	0.159***	0.219***
	-0.038	-0.0325	-0.0436	-0.0469	-0.0354	-0.0571
3rd-tier-city districts, South	0.0698**	0.107***	0.0518*	0.0866**	0.0977***	0.0780*
	-0.0276	-0.0261	-0.0283	-0.0355	-0.0226	-0.0403
No-city districts, South	0.0144	0.0475**	0.000859	0.0335	0.0603***	0.0177
	-0.0182	-0.0211	-0.0196	-0.027	-0.0203	-0.0297

Table A.1 Continued

	Comparing with the rest of households			Comparing with mixed households		
Independent variable	**All households**	**Youth-headed households**	**Other-adult-headed households**	**All households**	**Youth-headed households**	**Other-adult-headed households**
Education level ("no education" omitted)						
Primary completed	0.112***	0.137***	0.0988***	0.109***	0.0895***	0.109***
	-0.00548	-0.00575	-0.00541	-0.00745	-0.00715	-0.00788
Secondary completed	0.318***	0.267***	0.268***	0.250***	0.197***	0.270***
	-0.00918	-0.0105	-0.00699	-0.00883	-0.00966	-0.0091
Tertiary and above	0.470***	0.386***	0.350***	0.293***	0.210***	0.330***
	-0.0122	-0.0151	-0.0114	-0.0122	-0.0185	-0.0153
Community variable						
Electricity	0.267***	0.333***	0.239***	0.335***	0.328***	0.334***
	-0.0529	-0.0526	-0.0547	-0.0632	-0.0482	-0.0751
Observations	374,568	116,965	257,603	150,066	50,514	99,552

Source: Authors' own estimation using Census 2000 and Census 2010.
Note: The regressions include only rural households. * $p < 0.1$. ** $p < 0.05$. *** $p < 0.01$.

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