Farm-Nonfarm Labor Mobility in Rural Bangladesh

Intersectoral Shift or Intergenerational Occupational Choice?

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Contents

Tables

ABSTRACT

The paper argues that much of the farm-nonfarm labor mobility in rural Bangladesh is in nature an intergenerational occupational choice-induced change rather than a sectoral shift within the current generation. Bangladesh has a large share of youth (aged 15-29 years) in the labor force, and it experienced a major structural shift in employment between 1995 and 2010 as agricultural employment fell from 51.4 percent to 42.3 percent. Much of this shift has been due to changes in youth employment, as youth employment in agriculture fell from 49.8 percent to 33.1 percent. The cohort analysis (pseudo-panel) shows that the reduction in the share of male youth population working in agriculture is due mainly to a sharp reduction in the percentage of youth who start out in agriculture, rather than a shift by individuals from agricultural to non-agricultural employment during their life time. Analysis of correlates of the non-farm orientation of rural youth indicates the importance of gender, human capital, access to electricity, proximity to cities, and migration opportunities. The results suggest the importance for supporting rural industry and service activities for meeting the future demand of jobs for the rural youth.

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I. INTRODUCTION

Workers enter the non-farm sector labor force through two routes: (a) through the route of *intersectoral mobility* whereby they are initially engaged in the farm sectors, but subsequently they make a transition to the non-farm sectors, or (b) through the route of *aspiration-driven occupational choice* whereby they start their career in the non-farm sector to begin with, and stay on that course through the rest of their working lives. Which of the routes better characterize the contemporary farm-nonfarm transition in Bangladesh? The paper tests the strength of these contending routes by analyzing the pattern of youth employment in contrast to the adult work force in rural areas of Bangladesh. The choice of the study is deliberate. Arguably, the dichotomies between the two routes are particularly pronounced in the case of the youth labor force, which constituted about 40 percent of the country's total labor force in 2010. The argument is that youth, including the rural youth, are aspiration-wise more inclined toward non-farm sectors because of their better exposure to modern systems of education, technology and media.[1]

Significant structural change has taken place in Bangladesh's labor markets over the past two decades. Between 1995 and 2010, the share of agricultural employment in total employment fell by a quarter (from 63.2 percent to 47.5 percent)[2], even though the share of agriculture in GDP fell by only 6.7 percentage points (from 24.5 to 17.8 percent). The major shift in the sectors of employment that has taken place in Bangladesh has already been noted in recent labor market analyses (Hossain, Sen, and Sawada 2016, Rahman and Islam 2013, Gautam and Faruqee 2016). However, little attention has been paid to understanding the drivers behind these shifts. For

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[1] For the qualitative argument on non-farm aspiration as applied to rural youth, see Narayan (2009).

[2] Calculated from the Labor Force Survey (LFS) for 1995/96 and 2010 (BBS).

example, the farm-nonfarm shift in rural youth employment (defined as belonging to the age-group of between 20 and 34)[3] has received scant attention in the transformation literature, even though the changes have been dramatic here. According to Bangladesh Labor Force Survey (LFS) data, rural youth employment in agriculture fell from 58.7 to 39.8 percent between 2000 and 2013. At the same time, rural youth employment in manufacturing increased from 13.6 to 26.4 percent.[4] Implications of the more non-farm orientation on the part of youth for understanding rural structural transformation have not been subjected to analysis either.

The present paper has produced two major findings. First, it shows that much of the intersectoral mobility of labor—from farm to nonfarm sectors—can be explained by different occupational choices of youth compared with adults when entering the labor force. This we show by constructing a pseudo-panel conditional on age-group and residence characteristic using the Bangladesh Household Income Expenditure Survey (HIES) rounds of 1995/96 and 2010. Data on age cohorts from 1995–2010 suggests that the 12.6 percentage point reduction in the share of younger adult males working in agriculture is due mainly to a sharp reduction in the percentage of youth who start out in agriculture, rather than a shift by individuals from agricultural to non-agricultural employment over time. We interpret this result by inferring that youth have a

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[3] This definition deviates from the UN definition of youth as being in the age-group of 15-25. The deviation made in the paper considers the legacy of "academic session delays" in the 1990s and 2000s, resulting from frequent strikes (*hartals*), causing unavoidable delays in the completion of post-secondary schools and influencing late entry of the youth into the job market.

[4] Similar shifts have taken place in the employment pattern of female youth in rural areas, though here the distinction must be made between those who stayed back in village and those who left for urban work. Among those who left for urban work, many joined as industrial workers in the readymade garment sector where over 80% of the workers are recruited from the age group of 18 to 25 (Sen 2014). Those who stayed back in the village they actively took part in labor force, though participation outside the home is still very low.

different preference structure that overwhelmingly favors the non-farm occupations and the biases are increasing over time due to the "revolution in aspirations". The results show that intergenerational preferences that privilege nonfarm over farm sectors are the major driver behind the observed shift from farm to nonfarm sectors over time. This has been borne from the cohort analysis of both the youth and adult workforces. Second, to the extent that the intersectoral current mobility of rural labor is mainly influenced by intergenerational aspirational mobility associated with non-farm sectors, the issue then becomes one of finding the factors that robustly associate with the occupational choice of youth and their preferences for the nonfarm sectors.

Accordingly, in the first part of the paper, we examine current employment trends in rural Bangladesh and overall macro factors conditioning these changes, with a focus on youth and women's employment. We examine to what extent these major shifts in employment towards the non-farm sector are common to both youth (15–34) and adults (35–65). We then show that the farm-nonfarm shift is much more prominent over time in the case of the youth labor force compared to the adult labor force. However, this pronounced non-farm orientation came because of the youth's *initial* occupational choice when entering the labor force, and not as an outcome of a transition from farm to non-farm sectors. This important point is indicated by the pseudo-panel analysis. In the second part of the paper we quantitatively assess the factors that are strongly associated with the occupational choice of the youth labor force as distinct from the adult sample. This enables us to offer some policy implications that can help accelerate the pace of farm-nonfarm transition via the route of youth aspiration. The implications are two-fold. Firstly, Bangladesh is in the middle of a phase of a "demographic dividend". Such a youth-focused intersectoral mobility strategy can be consciously supported by the government as part of

realizing the benefits of the "demographic dividend". Secondly, a better designed entry into the non-farm sectors for the youth workforce can accelerate the rural structural transformation process.

The rest of the paper is organized into five sections as follows. In the second section, we examine trends and patterns of employment, covering unemployment and major sectors of employment in the rural areas as well as the national economy, using data from various rounds of both the LFS and the HIES. The third section presents the analysis of youth's occupational choice vs. their movements across farm-nonfarm sectors based on a pseudo-panel analysis for the youth age cohort based on the HIES 1995/96 ad 2010 HIES rounds. The fourth section presents econometric analysis using a multinomial logit model to better understand individuals' choice of sector of employment (agriculture, industry, or services), highlighting how these choices differ by age group and gender, using both HIES and the 2000 and 2015 rounds of the LFS data. The last section summarizes key findings, discusses policy implications, and suggests areas for further research.

II. THE STRUCTURE AND EVOLUTION OF EMPLOYMENT IN BANGLADESH

Bangladesh has achieved sustained economic growth and steady poverty reduction over the last two decades, with an annual average per capita GDP growth of 4.9 percent and a steep decline in poverty from 58 percent in 1991 to 31 percent in 2010 (from 59 percent to 35 percent in rural areas). Over the period, Bangladesh went through a shift in GDP structure. The share of agriculture in GDP fell, while the share of manufacturing GDP rose from 11.1 percent in 1980 to 17.9 percent in 2010 (Table 1). The service sector's contribution to growth remained relatively stable over the period, but with a steady increase in the importance of wholesale and retail trade, transport, and communications. This has resulted in noticeable changes in the structure of employment, including rural employment, as discussed below.

Table 1. Bangladesh: Macroeconomic performance, 1991–2014

Five yearly average		Years				
		1991–95	1996–2000	2001–05	2006–10	2011–14
GDP growth rate		4.50	5.21	5.44	6.21	6.29
Share in GDP	Agriculture	29.23	25.68	25.03	19.65	17.13
	Industry	21.04	24.87	26.20	27.67	28.52
	Service	49.73	49.45	48.77	52.69	54.36
Investment (as percent of GDP)	Overall	18.75	21.50	23.62	24.81	28.18
	Public	6.65	6.78	6.44	5.15	6.24
	Private	12.10	14.74	17.18	19.65	21.95
Trade ratio (as percent of GDP)	Overall	22.20	28.32	32.88	41.42	47.85
	Export	8.30	11.08	13.36	17.72	20.45
	Import	13.90	17.24	19.52	23.70	27.40
Remittance (in billion US$)		0.97	1.57	2.93	7.87	12.25
Budget deficit excluding foreign grants (as percent of GDP)		-5.20	-4.50	-4.52	-4.48	-4.50
Real exchange rate		57.30	60.33	67.56	69.02	70.93
Inflation		6.10	5.83	3.12	7.66	9.71

Source: Calculated from Bangladesh Economic Review 2015, Ministry of Finance, Government of Bangladesh.

In this section, we use two primary data sources for analysis, the household income and expenditure survey (HIES) and the labour force survey (LFS), for analysing rural employment. The HIES is conducted every 5 to 7 years and includes questions on sector of employment and occupation, as well as household expenditures and consumption. In the 2010 HIES, the survey covered 12,240 households; 7,840 from rural areas and 4,400 from urban areas, covering in total 612 primary sampling units (PSUs).[5] The LFS is conducted every 4 to 5 years and was piloted in 1980. In the initial years, the LFS survey used the sampling framework of the HIES, but in recent years the LFS sampling framework has been extended to 1,000 PSUs based on the sampling frame of the population census. Thus, the LFS sample is much larger in scope than the HIES. In the 2010 LFS, 43,925 households were covered; 9,325 in urban areas and 34,620 in rural areas. The LFS focuses on size and composition of labor force, type of occupation, and employment status. It does not include an estimation of consumption and only includes information on wage income.

HIES data indicate the following pattern of change in the structure of employment. Overall, in 1995, 50.0 percent of the employed population in Bangladesh (14.11 million people) worked in agriculture, 7.0 percent in manufacturing (2.22 million people), 5.3 percent in construction and other industry, and 36.9 percent in services (Table 2). By 2010, substantial structural change had taken place in the Bangladesh economy. Although absolute agricultural employment had risen by 11.9 percent between 1995 and 2010, its share in total employment had fallen by 9.7 percentage points to 40.3 percent. Manufacturing's share of employment had risen by 11.7 percentage points to 19.6 percent, while the share of services had fallen slightly from 36.9 to 34.5 percent.

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[5] 612 Primary Sampling Units (PSUs)—equivalent to lowest level revenue jurisdiction called *Mouzas*—were randomly selected from 16 strata based on the sample frame of population census.

Table 2. Bangladesh employment by sector, 1995 and 2010.

	Rural		Urban		Total	
	millions	percent	millions	percent	Millions	percent
1995						
Agriculture	13.73	59.3%	0.38	7.5%	14.11	50.0%
Manufacturing	1.46	6.3%	0.76	14.9%	2.22	7.9%
Construction	0.85	3.7%	0.24	4.8%	1.10	3.9%
Other Industry	0.28	1.2%	0.11	2.1%	0.39	1.4%
Service	6.83	29.5%	3.60	70.6%	10.43	36.9%
Total	23.16	100.0%	5.09	100.0%	28.25	100.0%
2010						
Agriculture	14.80	53.7%	0.99	8.5%	15.79	40.3%
Manufacturing	3.83	13.9%	3.88	33.3%	7.70	19.6%
Construction	1.29	4.7%	0.59	5.1%	1.88	4.8%
Other Industry	0.17	0.6%	0.13	1.1%	0.30	0.8%
Service	7.48	27.1%	6.05	52.0%	13.53	34.5%
Total	27.58	100.0%	11.64	100.0%	39.21	100.0%

Source: Calculated from Bangladesh Household Income and Expenditure Surveys.

Although the shift from agriculture sector employment to manufacturing in rural Bangladesh was less pronounced, it was still large. In 1995, 59 percent of Bangladesh's rural employed population worked in agriculture and only 6 percent in manufacturing. In 2010, 54 percent worked in agriculture, whereas 14 percent worked in manufacturing. This represents a 6-percentage point decline in agriculture employment and an eight-percentage point increase in manufacturing employment. Other industry employment did not change in the same period and service sector employment declined by 2 percentage points, like the patterns observed in urban areas. Labor force survey data shows a much sharper decline in agricultural employment in rural areas, from 61 to 38 percent in large part because of a major increase in recorded female employment (Table 3). For males, agriculture still accounted for 57.5 percent of the 27.5 million men employed in rural areas in 2010, a reduction of 6.1 percentage points from 1995. Over this period, male employment in industry more than doubled, from 2.1 million to 4.5 million, reaching 16.5 percent of employment.

Table 3. Bangladesh rural employment by sector and gender, 1995 and 2010

		1995 Male	2010 Male	1995 Female	2010 Female	1995 Total	2010 Total
Agriculture	Percent	63.6%	57.5%	30.7%	38.8%	60.6%	37.7%
	Millions	14.65	15.77	0.69	1.21	15.34	16.98
Manufacturing	Percent	4.5%	11.5%	21.2%	27.5%	6.0%	8.9%
	Millions	1.05	3.16	0.47	0.86	1.52	4.02
Construction	Percent	3.6%	4.4%	2.5%	3.7%	3.5%	3.0%
	Millions	0.83	1.21	0.06	0.12	0.88	1.33
Other industry	Percent	0.9%	0.6%	3.1%	0.9%	1.1%	0.4%
	Millions	0.21	0.15	0.07	0.03	0.28	0.18
Service	Percent	27.4%	26.0%	42.5%	29.0%	28.7%	50.0%
	Millions	6.31	7.15	0.95	0.90	7.26	22.52
Total	Percent	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Millions	23.05	27.45	2.23	3.11	25.29	45.03

Source: Calculated from Bangladesh Household Income and Expenditure Surveys.

Women account for only a small share of employment in both rural and urban areas (8.6 and 15.6 percent, respectively), despite rapid increases in women's employment outside the home in the past few decades. Women's employment outside of "domestic" household work increased by 39 percent from 1995 to 2010, from 2.2 million to 3.1 million. Industry (mainly textiles) accounted for 1.0 million of these jobs, an increase of 67 percent from 1995 (Table 4). However, female agricultural employment rose even faster (by 76).

Table 4. Bangladesh: Labor force participation and employment by sector, 1995 and 2010

	Males 1995	Males 2010	Percent Change	Females 1995	Females 2010	Percent Change
Agriculture	14.650	15.773	7.7%	0.686	1.210	76.4%
Industry	2.089	4.534	117.0%	0.598	1.000	67.2%
Services	6.313	7.148	13.2%	0.950	0.904	-4.8%
Unemployed	1.668	3.415	104.8%	1.925	4.239	120.2%
Domestic	0.251	0.300	19.2%	21.627	26.683	23.4%
Student	2.407	2.816	17.0%	1.099	2.263	106.0%
Total	27.377	33.986	24.1%	26.885	36.300	35.0%
Annual Average	---	---	1.5%	---	---	2.0%

Note and Source: Figures in million. Authors calculations from Bangladesh Household Income and Expenditure Survey (HIES) data.

Overseas migration for work accounts for about 5 to 7 percent of overall employment for Bangladeshi men. HIES data indicate that the working age population of men rose 41.6 percent from 1995 to 2010 (from 33.3 to 47.2 million), while the working age population of women rose by 52.3 percent over the same period. Temporary migration to the Middle East and other destinations for work appears to account for much of the difference in growth rates between men and women. According to the National Population and Housing Census, 2.8 million members of Bangladesh households were living abroad, 95 percent of whom were men.[6] If the stock of female migrants is included in the 2010 population estimate, the female working age population increases to 49.9 million, a 52.7 percent increase. Assuming the male working age population also rose by this percentage, the 2010 male working age population was 50.9 million, of which 2.7 million (5.2 percent) were migrants, leaving approximately 1.0 million men (2.0 percent) unaccounted for (that is, "missing").[7] (See Annex Table A1.)

Rural population growth rates differ substantially from urban growth rates, though some of this difference may be due to increased number of cities, rather than actual rural to urban migration. Overall, the working age population rose by 127.3 percent in urban areas, but only 29.5 percent in rural areas. Changes in urban population are broadly similar for men and women (7.3 and 7.7 million people, respectively). However, the increases in female working age population in rural areas were substantially larger than for males (9.4 and 6.6 million people,

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[6] Bangladesh Bank data on overseas employment indicate lower figures, ranging from 187.5 thousand in 1995 to 875.1 thousand in 2008, falling to 568.1 thousand in 2011. One reason for the lower figures is that this data reflects new migrants and many migrants do not return for several years. See Etzold and Mallick (2015).

[7] Unfortunately, neither the HIES nor the LFS trace individuals over time or include questions regarding former employment.

respectively), suggesting that much of the international migration for work was by men from

rural areas.[8]

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[8] HIES data for 2010 indicate that 24.4 percent of rural households have at least one migrant member irrespective of their

place of work. This gives an indication of the scale of migration from rural areas (more on this later).

III. STRUCTURAL CHANGE AND YOUTH EMPLOYMENT: COHORT ANALYSIS

Much of the observed structural change in labor markets observed in Bangladesh is due to changes in youth employment. The data presented in Table 5 demonstrates that the farm–nonfarm transition in rural Bangladesh is occurring between generations as opposed to between cohorts. In 1995, 53.4 percent of the male rural youth population in rural Bangladesh age 20 to 34 years was employed in agriculture. In 2010, only 40.8 percent of the male rural youth population was employed in agriculture—a 12.6 percentage point decrease. By contrast, the decline in agricultural employment for adult males 35 to 49 years of age was much less, from 59.3 percent in 1995 to 59.1 percent in 2010, a 0.2 percentage point decrease. Employment in agriculture for older adults (age 50 to 64 years) fell by 1.1 percentage points from 66.2 to 65.1 percent.

Table 5. Bangladesh sector of employment by age group, 1995 and 2010

		Agriculture	Industry	Services	Unemployed	Student
1995	20–34	53.4%	9.4%	26.0%	4.8%	6.3%
2010	20–34	40.8%	18.7%	27.2%	7.5%	5.8%
	% pt. change	-12.6%	9.3%	1.1%	2.7%	-0.6%
1995	35–49	59.3%	8.2%	30.8%	1.8%	0.0%
2010	35–49	59.1%	12.9%	25.7%	2.3%	0.0%
	% pt. change	-0.2%	4.8%	-5.1%	0.6%	0.0%
	Cohort change	5.7%	3.5%	-0.4%	-2.4%	-6.3%
1995	50–64	66.2%	5.8%	20.5%	7.5%	0.0%
2010	50–64	65.1%	7.4%	18.4%	9.1%	0.0%
	% pt. change	-1.1%	1.6%	-2.1%	1.6%	0.0%
	Cohort change	5.8%	-0.7%	-12.4%	7.3%	0.0%

Source: HIES 1995 & 2010, BBS.

Data on age cohorts from 1995–2010 suggests that the 12.6 percentage point reduction in the share of younger adult males working in agriculture is due mainly to a sharp reduction in the percentage of youth who start out in agriculture, rather than a shift by individuals from agricultural to non-agricultural employment. Agricultural employment of the male cohort who were 20 to 34

years of age in 1995 rather increased by 5.7 percentage points from 53.4 to 59.1 percent between 1995 and 2010. Similarly, the share of employment in the agricultural sector increased by 5.8 percent points for the cohort who were 35 to 49 years of age in 1995, going from 59.3 percent in 1995 to 65.1 in 2010. For this cohort, service sector employment fell by 12.4 percentage points (from 30.8 percent in 1995 to 18.4 percent in 2010).[9]

This decrease in agriculture employment amongst youths resulted in a similar increase in industry sector employment. In 1995, 9.4 percent of rural male youths ages 20 to 34 were employed in industry, whereas in 2010, 18.7 percent of rural youths were employed in the sector. This is a 9.3 percentage point increase inter-generationally. However, based on cohort analysis, the matched extent of increase turns out to be only 3.5 percentage points over the same period. This increase was indeed a shift from agriculture to manufacturing, as service sector employment increased slightly between the two years.

Other age groups did not experience as large an increase in industry sector employment; a 4.8 percentage point increase for adults, and a 1.6 percentage point increase for older adults. Further, this increase, however, was most likely not a result of movement out of the agriculture sector, but instead a result of decreased service sector employment. The cohort change in industry employment for the cohort aged 35–49 in 1995 was -.7 percent. In this case, there was movement away from industry in the older cohort.

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[9] Using younger age cohorts, in 1995, 37.3 percent of the male youth population in rural Bangladesh ages 15 to 29 years was employed in agriculture. In 2010, only 23.6 percent of the youth rural population was employed in agriculture—a 13.7 percentage point decrease. Agricultural employment of the cohort who were 15 to 29 years of age in 1995 increased by 4.0 percentage points from 37.3 percent to 41.3 between 1995 and 2010.

Compared with men, females only experienced small changes in employment patterns across age-groups and cohorts (as defined with the age cutoffs above). Slightly more distinct patterns are found, however, for narrower age cohorts; females age 15–29 (30–34), 20–24 (35–39), and 25–29 (40–44). There is an increase in employment in manufacturing from 3.4 percent of females (15–19) in 1995 to 5.4 percent of females (15–19) in 2010. There is a slightly larger increase for females in the slightly older age cohorts from 3.2 percent of females (20–24) in 1995 to 5.5 percent of females (20–24), a 2.3 percentage point change and from 2.7 percent of females (25–29) in 1995 to 5.1 percent of females (25–29), a 2.4 percentage point change. Looking at age cohorts, the largest increase in manufacturing sector employment occurred within the 15–19 (1995) age cohort, who increased their share in manufacturing by 3 percentage points to 6.8 percent of females (30–34) in 2010.

IV. CORRELATES OF THE SECTORAL ORIENTATION OF YOUTH EMPLOYMENT

To better understand the relationship between youth and rural development in Bangladesh, we analyze the determinants of individuals' sector of employment using a multinomial logit model. In this model, we compare the probability of an individual choosing to enter the industry or service sector instead of entering the agriculture sector, the base sector of employment in our multinomial regression.[10]

The general form of the equation is:

$$\log\left(\frac{\pi_{ji}}{\pi_{ai}}\right) = \sum \alpha_{jk} + \sum \beta_{ji} X_i + e_{ji},$$

where π_{ji} is the probability that individual i works in non-agricultural sector j (j = manufacturing or services), π_{ai} is the probability that individual i works in the agricultural sector, X_i are exogenous variables, e_{ji} is the error term, and α_{jk} and β_j are parameters to be estimated. Standard errors are clustered at the thana *(upazila)* level[11] to allow for arbitrary correlations between individuals in the same region.

We estimate three different models with the HIES data. In the first model, we include the entire sample of the rural employed population aged 15 to 64. In the second model, we divide the rural sample into male and female groups to determine if the drivers of employment differ by gender. For the third model, we split the rural sample into youth (15–34) and adult (34–64)

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[10] The choice of the base sector of employment makes no difference to the logic of the model, but for computational reasons, the main sector of employment is generally used as the base choice in a multinomial logit regression.

[11] Upazilas, formerly called thanas, are sub-districts, the administrative units just below districts. Bangladesh has 64 districts and 490 thanas (upazilas).

regressions, to focus on what spatial or household specific characteristics determine sector of employment for youth.

The regressions are carried out at the individual level. All regressions control for both individual level variables (youth (15–34), gender, household head, marital status, and number of years of schooling) and household level variables (for example, number of men/women of working age, land operated, livestock ownership, access to electricity, and access to an improved water source). We also consider a set of thana level variables such as percent of households within a thana with access to electricity, the percent of households without agriculture land in the thana, the average per capita agriculture plot size, the average value of cereals grown in the thana, the percent of households living under the poverty line, and the average years of schooling at the thana level. In addition, we control for district-wide fixed effects in all models to consider unobserved factors common to each district. Descriptive statistics for all variables are shown in Annex Table A2.

For each model, we run three regressions: a pooled regression with data from both 1995 and 2010 that includes a dummy variable for year (2010 = 1) and an interaction term equal to the dummy variable times the youth variable, a 1995 only regression, and a 2010 only regression. Tables 6 and 7 present the calculated marginal effects of change in each independent variable on the probability of participating in the industrial or services sectors.

We also run several regressions using LFS data, for roughly the same period (2000–2003), as a robustness check for our HIES results (BBS 2003). We also use a multinomial logit model for this data, but this time, at the household level, dividing households into three household groups, agriculture employment only, mixed employment, and non-agriculture employment.

Table 6. Bangladesh: Multinomial logit regression with youth interactions (rural)

	Industry pooled	Services pooled
Female	0.075	0.132
	(2.83)**	(2.26)*
Female*youth	-0.022	-0.182
	(0.61)	(2.39)*
Head	-0.067	-0.019
	(4.05)**	(0.57)
Head*youth	0.01	0.044
	(0.42)	(1.19)
Unmarried	-0.024	-0.008
	(0.41)	(0.14)
Unmarried*youth	0.031	-0.051
	(0.53)	(0.89)
Number of years of schooling	-0.001	0.029
	(0.92)	(17.48)**
Number of years of schooling*youth	0.003	0.001
	(1.72)	(0.37)
Number of working age men in HH	-0.005	0.021
	(0.77)	(2.53)*
Number of working age men in HH*youth	0.013	-0.014
	(1.52)	(1.26)
Number of working age women in HH	-0.009	0.023
	(0.76)	(0.62)
Number of working age women in HH*youth	0.034	0.073
	(2.13)*	(1.70)
Amount of land operated HH	-0.024	-0.048
	(2.43)*	(5.30)**
Amount of land operated HH*youth	-0.011	0.045
	(1.05)	(3.81)**
HH has livestock	-0.02	-0.034
	(1.28)	(1.84)
HH has livestock*youth	-0.003	-0.026
	(0.21)	(0.95)
HH access to improved water source	0.007	0.062
	(0.23)	(1.40)
HH access to improved water source*youth	-0.078	0.123
	(1.75)	(1.73)
HH access to electricity	0.005	0.033
	(0.30)	(1.46)
HH access to electricity*youth	-0.029	0.004
	(1.31)	(0.11)
Thana percent access to electricity	0	0
	(1.40)	(0.86)
Thana percent access to electricity*youth	0	0
	(0.91)	(0.38)
Thana percent of HH's who have no agriculture land	0.001	0.002
	(1.90)	(3.00)**
Thana percent of HH's who have no agriculture land*youth	0	0.001
	(1.10)	(1.35)
Thana value of cereal production	-0.088	-0.113
	(2.90)**	(2.73)**

Table 6. (continued)

	Industry pooled	Services pooled
Thana value of cereal production*youth	0.068	0
	(2.43)*	(0.01)
Thana per capita average rural land holdings	-0.002	0.021
	(0.17)	(1.56)
Thana per capita average rural land holdings*youth	-0.015	-0.012
	(1.38)	(0.86)
Thana percent of HH's under the poverty line	0	-0.001
	(0.31)	(2.90)**
Thana percent of HH's under the poverty line*youth	0	0
	(0.92)	(0.14)
Travel time categories to nearest 250,000 city	-0.011	-0.013
	(1.13)	(0.82)
Travel time categories to nearest 250,000 city*youth	-0.005	-0.016
	(0.64)	(1.23)
N	15,957	15,957
Chi2 of interaction variables	88.16	
Prob> chi2	0.0000	

Source: Authors' calculations from multinomial regression using Bangladesh HIES data.

Pooled regressions from the HIES including both 1995 and 2010 data, along with youth interaction terms, demonstrate that the effects of most explanatory variables (including gender, marital status, number of working age men and women, and amount of land operated) are significantly different for youth as compared with adults (Table 6). At the same time, explanatory variables such as years of education, and household head are not different for youth and adults.

Table 7. Bangladesh: Determinants of sector of rural employment (marginal effects)

	Industry pooled	Services pooled	1995 industry	1995 services	2010 industry	2010 services
Youth	0.003	0.02	0.007	0.026	0.042	0.022
	(0.36)	(1.50)	(0.73)	(1.74)	(4.30)**	(1.75)
Youth*year	0.036	0.033				
	(3.21)**	(2.47)*				
Female	0.058	0.034	0.065	0.038	0.064	-0.005
	(3.02)**	(0.87)	(2.73)**	(0.78)	(2.16)*	(0.13)
Head	-0.06	0.007	-0.06	0.015	-0.076	-0.022
	(5.85)**	(0.44)	(4.54)**	(0.81)	(5.45)**	(1.30)
Unmarried	0.007	-0.06	-0.006	-0.057	0.033	-0.053
	(0.66)	(4.42)**	(0.52)	(3.81)**	(2.96)**	(3.04)**
Number of years of schooling	0	0.028	0	0.031	0.001	0.021
	(0.23)	(21.85)**	(0.03)	(19.74)**	(1.03)	(19.74)**
Number of working age men in HH	0.003	0.009	0.003	0.011	0.015	0.013
	(0.75)	(1.43)	(0.49)	(1.39)	(2.41)*	(1.94)
Number of working age women in HH	0.013	0.065	0.012	0.069	0.029	0.045
	(1.60)	(3.39)**	(1.09)	(2.94)**	(1.98)*	(2.68)**
Amount of land operated HH	-0.031	-0.016	-0.027	-0.017	-0.056	-0.045
	(6.74)**	(2.14)*	(5.35)**	(2.25)*	(6.75)**	(4.95)**
HH has livestock	-0.021	-0.05	-0.028	-0.045	-0.03	-0.066
	(1.96)*	(2.94)**	(1.56)	(2.10)*	(2.97)**	(4.56)**
HH access to improved water source	-0.033	0.133	-0.154	0.303	0.007	-0.034
	(1.29)	(3.38)**	(4.27)**	(7.70)**	(0.18)	(0.78)
HH access to electricity	-0.011	0.037	-0.027	0.051	0.016	0.027
	(1.26)	(2.14)*	(1.69)	(2.01)*	(1.41)	(2.12)*
Thana percent access to electricity	0.001	0	0.001	0	0.001	0
	(2.03)*	(0.09)	(2.79)**	(0.07)	(2.80)**	(1.04)
Thana percent of HH's who have no agriculture land	0	0.002	0.001	0.003	0	0.002
	(1.51)	(4.17)**	(1.61)	(4.66)**	(0.11)	(3.86)**
Thana value of cereal production	-0.048	-0.135	-0.289	-0.274	0.001	-0.045
	(1.80)	(3.39)**	(3.15)**	(3.11)**	(0.05)	(2.35)*
Thana per capita average rural land holdings	-0.01	0.018	0.006	0.018	-0.023	0.037
	(0.88)	(1.62)	(0.40)	(1.37)	(1.52)	(2.37)*

Table 7. (Continued)

	Industry pooled	Services pooled	1995 industry	1995 services	2010 industry	2010 services
Thana percent of HH's under the poverty line	0	-0.001	0	-0.001	0.001	0
	(0.93)	(2.66)**	(0.45)	(2.61)**	(2.27)*	(0.39)
Thana average years of schooling	0.004	0.025	0.003	0.034	0.019	0
	(0.48)	(1.97)*	(0.32)	(2.21)*	(2.56)*	(0.05)
Travel time categories to nearest 250,000 city	-0.014	-0.017	-0.03	0.01	-0.001	-0.018
	(1.55)	(1.16)	(3.49)**	(0.78)	(0.08)	(1.78)
Year	0.022	-0.163				
	(1.09)	(5.69)**				
N	15,957	15,957	6,564	6,564	9,393	9,393

Source: Authors' calculations from multinomial regression using Bangladesh HIES data.

In the following discussion, we focus largely on the results for the youth sub-sample (Table 8); results for non-youth are show in Annex Table A3 and results for females are shown in Annex Table A4. Results for the pooled regression sample (columns 1 and 2 in Table 7) indicate that the probability of non-agricultural employment is significantly higher for youths in 2010 but not in 1995. Splitting the sample by year confirms this result. In 2010, the probability of employment in industry is 4.2 percentage points greater for youths than for adults with similar education and experience (column 6). No statistically significant difference is found for youths in 1995 for either industrial or service sector employment (or for service sector employment in 2010).[12]

Not surprisingly, gender is a major factor in employment. Historically, there is a very large gap between male and female workforce participation rates. However, female participation has risen quite impressively over the last 15 years from a low base.[13]

The probability of being employed in industry is greater for females than for males, controlling for other factors. This is true for both youth females and adult females. Thus, in 2010, females have a statistically significant greater probability of being employed in industry than do males. However, this is not true for 1995, indicating that the increased industrial orientation is of recent origin.

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[12] In part the lack of a significant difference in industrial employment for youths in 1995 may be due to the limited size of the industrial sector at that time.

[13] This is best illustrated by the LFS data. In 1995/96, the female labor force participation rate was only 16 percent, which rose to 29 percent in 2010 (male participation rate remained stable at 87 percent during the same period).

Table 8. Bangladesh: Determinants of sector of rural employment (marginal effects), rural youth sample

	Industry pooled	Services pooled	1995 industry	1995 services	2010 industry	2010 services
Female	0.069	-0.044	0.057	-0.038	0.102	-0.041
	(2.18)*	(0.86)	(1.63)	(0.63)	(2.02)*	(0.82)
Head	-0.068	0.038	-0.071	0.043	-0.071	0.012
	(3.89)**	(1.81)	(3.53)**	(1.69)	(3.18)**	(0.51)
Unmarried	0.01	-0.058	-0.009	-0.05	0.051	-0.069
	(0.77)	(4.06)**	(0.58)	(3.19)**	(3.50)**	(3.86)**
Number of years of schooling	0.002	0.029	0.002	0.031	0	0.023
	(1.43)	(16.25)**	(1.18)	(13.75)**	(0.04)	(13.01)**
Number of working age men in HH	0.007	0.011	0.007	0.01	0.026	0.019
	(0.93)	(1.13)	(0.89)	(0.96)	(2.75)**	(1.96)*
Number of working age women in HH	0.023	0.096	0.029	0.096	0.038	0.064
	(2.04)*	(5.67)**	(2.46)*	(4.46)**	(1.76)	(2.86)**
Amount of land operated HH	-0.039	0	-0.037	-0.001	-0.052	-0.024
	(8.30)**	(0.01)	(7.08)**	(0.09)	(4.80)**	(2.81)**
HH has livestock	-0.027	-0.054	-0.035	-0.052	-0.035	-0.058
	(2.05)*	(2.28)*	(1.80)	(1.88)	(2.56)*	(2.82)**
HH access to improved water source	-0.065	0.203	-0.254	0.446	-0.022	-0.034
	(1.59)	(3.20)**	(3.01)**	(6.90)**	(0.42)	(0.62)
HH access to electricity	-0.03	0.042	-0.054	0.048	0.01	0.021
	(2.17)*	(1.72)	(2.00)*	(1.33)	(0.64)	(1.39)
Thana percent access to electricity	0.001	0	0.001	0	0.002	0
	(2.09)*	(0.29)	(2.77)**	(0.47)	(3.21)**	(0.03)
Thana percent of HH's who have no agriculture land	0	0.003	0	0.003	0	0.002
	(0.24)	(3.82)**	(0.53)	(4.02)**	(0.75)	(2.88)**
Thana value of cereal production	-0.06	-0.108	-0.348	-0.255	0.012	-0.029
	(1.61)	(2.26)*	(2.91)**	(2.38)*	(0.45)	(0.97)
Thana per capita average rural land holdings	-0.014	0.021	-0.002	0.013	-0.035	0.031
	(0.76)	(1.39)	(0.09)	(0.89)	(1.86)	(1.47)
Thana percent of HH's under the poverty line	0	-0.001	0	-0.001	0.003	-0.001
	(1.09)	(1.88)	(0.69)	(1.81)	(3.24)**	(1.60)
Thana average years of schooling	0.005	0.02	-0.004	0.034	0.031	-0.009
	(0.48)	(1.27)	(0.30)	(1.92)	(2.87)**	(0.78)
Travel time categories to nearest 250,000 city	-0.019	-0.024	-0.038	0.008	0.001	-0.027
	(1.48)	(1.34)	(3.38)**	(0.52)	(0.04)	(1.72)
Year	0.078	-0.119				
	(2.68)**	(3.12)**				
N	7,675	7,675	3,241	3,241	4,434	4,434

Source: Authors' calculations from multinomial regression using Bangladesh HIES data.

What explains this "industry orientation"? Traditionally, female participation in the rural industrial sector—handloom/power-loom, rice mills and food processing, and other cottage manufactures—has been much higher for female workers compared to the male workers. Thus, even in the middle of the 1990s, 22 percent of female workers were employed in the industrial sector as opposed to 4.5 percent for male workers (Table 3). This female employment predisposition in rural industry has been retained in the later period.[14]

This gender difference does not vary by age, however. Regressions for females only indicate that youth females are no more likely than adult females to work in the industry sector (Annex Table A4). It should be noted, however, that for both 1995 and 2010, the probability of being in industry in comparison with agriculture is lower for female heads of household (by 4.8 percentage points in 1995 and 13.8 percentage points in 2010). This is most likely due to adverse correlation between female headship and extreme poverty (Rahman and Hossain 1995).

Looking at our LFS model, we find that the presence of female workers in a household increases that household's probability of being mixed, implying partial movement out of the agriculture sector (Table 9). However, depending on household member composition, the propensity for a woman to work off the family farms changes. While the presence of a female worker does increase the household's chance of being mixed, it also reduced the household's chance of being in the complete non-agriculture sector. We conjecture that nonfarm orientation on the part of female worker is facilitated by male participation in agriculture. If, however, there

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[14] Higher female participation in rural industrial sector is not to be mixed up with the well-known phenomenon of female orientation of readymade garments. The latter is urban based with high spatial concentration in Dhaka and Chittagong cities.

is no such male member in the household (as in the case of male out migration to cities or

abroad), then female workers are likely to be employed in the farm sector.

Table 9. Bangladesh: Determinants of sector of rural employment (marginal effects), LFS data

	LFS 2000				LFS 2013			
	Youth-migration		Youth-education		Youth-migration		Youth-education	
	Mixed	Nonfarm	Mixed	Nonfarm	Mixed	Nonfarm	Mixed	Nonfarm
Sex (female=1)	0.057***	-0.062***	0.056***	-0.061***	0.040***	-0.018***	0.041***	-0.019***
	(0.015)	(0.010)	(0.015)	(0.010)	(0.007)	(0.007)	(0.007)	(0.007)
Household head	0.002	-0.020*	0.003	-0.019*	-0.029***	0.057***	-0.028***	0.058***
	(0.016)	(0.011)	(0.016)	(0.011)	(0.008)	(0.007)	(0.008)	(0.007)
Married	0.02	-0.034***	0.023	-0.034***	0.027***	-0.076***	0.028***	-0.076***
	(0.015)	(0.012)	(0.015)	(0.012)	(0.008)	(0.009)	(0.008)	(0.009)
Widowed/separated	-0.024	0.079***	-0.022	0.078***	-0.013	0.030**	-0.012	0.030**
	(0.030)	(0.028)	(0.030)	(0.027)	(0.014)	(0.015)	(0.014)	(0.015)
Primary schooling			0.038***	0.033***			0.006	0.059***
			(0.01)	(0.01)			(0.01)	(0.01)
Secondary schooling			0.094***	0.039***			-0.001	0.156***
			(0.014)	(0.009)			(0.007)	(0.006)
Secondary plus			0.189***	0.087***			0.023**	0.220***
			(0.021)	(0.015)			(0.009)	(0.009)
Number of working HH members	0.106***	-0.114***	0.106***	-0.114***	0.177***	-0.093***	0.177***	-0.093***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.002)	(0.003)	(0.002)	(0.003)
Received training				0.103***	0.117***		0.102***	0.113***
				(0.012)	(0.011)		(0.012)	(0.011)
Religion (non-Muslim=1)	0.049***	0.094***	0.049***	0.094***	-0.063***	0.021***	-0.062***	0.020***
	(0.015)	(0.012)	(0.015)	(0.012)	(0.007)	(0.007)	(0.007)	(0.007)
Log own land (in decimal)	-0.025***	-0.014***	-0.025***	-0.014***	-0.005***	-0.012***	-0.005***	-0.012***
	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Expenditure quintiles*								
2nd quintile	0.051***	0.003	0.051***	0.004	-0.002	-0.002	-0.002	-0.002
	(0.016)	(0.008)	(0.016)	(0.008)	(0.008)	(0.007)	(0.008)	(0.007)
3rd quintile	0.098***	0.028***	0.098***	0.029***	-0.012	0.021***	-0.012	0.021***
	(0.015)	(0.008)	(0.015)	(0.008)	(0.008)	(0.007)	(0.008)	(0.007)
4th quintile	0.106***	0.058***	0.106***	0.058***	0.008	0.036***	0.008	0.036***
	(0.017)	(0.011)	(0.017)	(0.010)	(0.008)	(0.007)	(0.008)	(0.007)
5th quintile	0.131***	0.106***	0.132***	0.106***	-0.014*	0.138***	-0.014*	0.138***
	(0.018)	(0.013)	(0.018)	(0.013)	(0.008)	(0.008)	(0.008)	(0.008)
percent HHs with electricity in district	0.231***	0.201***	0.232***	0.201***	-0.039**	0.176***	-0.039**	0.176***
	(0.04)	(0.02)	(0.04)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Domestic migration					-0.009	-0.004		
					(0.012)	(0.011)		
Foreign migration	-0.096***	-0.036**			-0.026**	-0.076***		
	(0.02)	(0.02)			(0.01)	(0.01)		

Table 9. (Continued)

	LFS 2000				LFS 2013			
	Youth-migration		Youth-education		Youth-migration		Youth-education	
	Mixed	Nonfarm	Mixed	Nonfarm	Mixed	Nonfarm	Mixed	Nonfarm
*Log travel time**					-0.004	-0.012***	-0.004	-0.012***
					(0.01)	(0.01)	(0.01)	(0.01)
Division (ref: Dhaka)								
Barisal	-0.005	0.005	-0.006	0.006	0.030***	0.005	0.031***	0.004
	(0.016)	(0.011)	(0.016)	(0.011)	(0.011)	(0.010)	(0.011)	(0.010)
Chittagong	-0.024*	-0.021**	-0.024*	-0.021**	0.039***	-0.007	0.039***	-0.007
	(0.014)	(0.009)	(0.014)	(0.009)	(0.008)	(0.007)	(0.008)	(0.007)
Khulna	-0.047***	-0.015	-0.046***	-0.015	0.033***	-0.034***	0.034***	-0.035***
	(0.016)	(0.011)	(0.016)	(0.011)	(0.009)	(0.008)	(0.009)	(0.008)
Rajshahi	-0.081***	0.004	-0.081***	0.004	-0.003	-0.078***	-0.003	-0.079***
	(0.015)	(0.010)	(0.015)	(0.010)	(0.008)	(0.007)	(0.008)	(0.007)
Rongpur	-0.070***	-0.043***	-0.070***	-0.043***	-0.015	-0.015	-0.015	-0.014
	(0.016)	(0.010)	(0.016)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Sylhet	-0.062***	-0.014	-0.062***	-0.013	-0.008	-0.015*	-0.007	-0.016*
	(0.019)	(0.012)	(0.019)	(0.012)	(0.009)	(0.009)	(0.009)	(0.009)
Illiterate youth	0.024*	0.004			0.038***	-0.004		
	(0.01)	(0.01)			(0.01)	(0.01)		
Primary adult	0.038**	0.032***			0.017**	0.039***		
	(0.02)	(0.01)			(0.01)	(0.01)		
Primary youth	0.061***	0.038***			0.025***	0.080***		
	(0.02)	(0.01)			(0.01)	(0.01)		
Secondary adult	0.118***	0.035***			0.021**	0.141***		
	(0.02)	(0.01)			(0.01)	(0.01)		
Secondary youth	0.099***	0.046***			0.011	0.171***		
	(0.02)	(0.01)			(0.01)	(0.01)		
Secondary plus adult	0.214***	0.094***			0.031**	0.236***		
	(0.03)	(0.02)			(0.01)	(0.01)		
Secondary plus youth	0.191***	0.080***			0.041***	0.206***		
	(0.03)	(0.02)			(0.01)	(0.01)		
Non-migrant youth			-0.075**	-0.063***			0.015**	0.014**
			(0.03)	(0.02)			(0.01)	(0.01)
Domestic migrant adult							0.008	-0.014
							(0.02)	(0.01)
Domestic migrant youth							-0.01	-0.101***
							(0.02)	(0.01)
Foreign migrant adult			0.017	0.003			-0.015	0.019
			(0.01)	(0.01)			(0.02)	(0.02)
Foreign migrant youth			-0.101***	-0.004			-0.024	-0.042***
			(0.03)	(0.02)			(0.02)	(0.01)
Observations	10316	10316	10316	10316	31774	31774	31774	31774

Notes: Standard errors in parentheses. * p<0.10, ** p<0.05,

Source: Authors' calculations from multinomial regression using Bangladesh LFS data.

Household demographic characteristics also play an important role in determining sector of employment. In general, household heads are more likely to work in agriculture than in industry. In 1995, the probability of being in industry is 4.8 percentage points lower for household heads than for non- household heads and in 2010 it is 7.1 percentage points lower. This holds true when the regression is done separately for male and female as well as adult and youth. For females and youth, the number of working age men and women in the household is positively associated with non-agricultural work, though for males and adults, there was little effect. Likewise, there was no clear relationship between marital status and sector of employment in 1995. However, in the 2010 sample, unmarried individuals are more likely to work in industry than in agriculture, and youths who were unmarried were 5.1 percent more likely to work in industry than married youths.

Although increased schooling is often associated with movement out of the agriculture sector to the non-agriculture sector, in Bangladesh, the story is more nuanced. Education is not correlated with employment in industry; individuals who work in manufacturing have roughly the same number of years of education as those who work in agriculture. This, in a sense, is expected given the relatively underdeveloped state of rural and cottage industry.[15] The picture is different for the service sector, however. In 1995, the probability of being in the service sector is 3.1 percentage points greater for educated individuals than for those with less education and in

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[15] The negative correlation between female education and industrial employment, as reported in Annex Table A4, should not create the impression that education does not lead to non-agricultural employment. This counter-intuitive result is specific to the rural areas only. The urban readymade garment sector where the bulk of female industrial employment is concentrated, demands at least primary level of schooling. Export-led industrialization may even have had broader human development effects (Heath and Mobarak 2014).

2010 it is 2.1 percentage points greater (Table 6, columns 4 and 6). This pattern holds for youths and adults, male and female, in general (Table 7 and Annex Table A4, columns 4 and 6). The underlying pattern points to the importance of the rural service sector (along with urban industries) as the mechanism for reducing surplus labor in the farm sector.

Looking at our LFS regressions, we find that education of individual household members has statistically significant effects on participation in non-agricultural sectors. Thus, the presence of educated workers in a household raises the probability of the household being "mixed" or non-agriculture compared with the reference category of farm household. In fact, the effect of human capital accumulation on raising the probability of nonfarm orientation is incrementally higher with each successive level of education. Comparing 2000 and 2013, we see that the matched effects of human capital in raising the probability of nonfarm orientation has increased significantly over time, especially at post-Primary level (Table 9).

As expected, individuals in households with more agriculture land and livestock are more likely to work in the farm sector than the nonfarm sector. This is true for both men and women as well as youth and adults. Moreover, employment in the agricultural sector is more likely in thana*s* with a higher value of cereal production. Distribution of land is also an important determinant of employment. Individuals from thanas with a high percentage of households without agricultural land are more likely to find employment in the service sector than the agriculture sector, again suggesting the role of service sector in farm–nonfarm transition in Bangladesh. Finally, the relationship between employment structure and the prevalence of poverty in the thana has changed over time. In 1995, we find that there is no relationship between poverty headcount and manufacturing. In 2010 we find that now, it is more probable that an individual is employed in the industry sector if he or she is from a poor region. This same

pattern holds for youths and males. Similarly, urban proximity (proxied by the travel time) used to matter for industrial employment in rural areas in 1995, but it is no longer an important predictor. One possible explanation is that connectivity has improved significantly across Bangladesh since 1995, especially after building the Jamuna Bridge, which drastically reduced travel time between the Eastern and Western regions of the country (Mahmud and Sawada 2014).

Infrastructure also matters for sector of employment. Access to electricity either at the household level or at the thana level was an important indicator of employment in the non-agricultural sector. Electricity at the household level was a predictor of employment in the service sector whereas access at the thana level was a predictor of industry sector employment. This differential impact of electricity may be because medium-scale industrial firms are typically located outside of the household, while service sector jobs can be run from the household or near the household, making a household electricity connection necessary. For youth, having electricity at the thana level was associated with employment in industry, but there was no relationship between household access to electricity and service sector employment.

Migration to cities and overseas plays an important role in offering the rural youth gainful nonfarm employment. According to the HIES data, about 14 percent of the rural households have at least one migrant member sending remittances from within the country and another 10 percent of rural households receive remittances from abroad, indicating the scale of importance of domestic and international migration for generating employment and income in rural Bangladesh. In terms of migration propensities, the HIES data further reveal that it is rural youth who are more prone to domestic migration compared to rural adults (38 versus 29 percent). In the case of international migration, rural youths are also fast catching up with the rural adults (62

versus 71 percent). Regressions including youth and migration interaction terms show that households with foreign youth migrants are less likely to self-select into mixed or nonfarm households (Table 9). This result suggests that to some extent, youth migration substitutes for employment in the domestic non-agricultural sector for rural households. They also suggest that it is the nonfarm youth workers who are essentially pulled out of rural areas for urban or overseas jobs. The sectoral transition for them does not, in most cases, take place from farm to urban nonfarm but from rural nonfarm to urban nonfarm sectors (Gautam and Faruqee 2016). Overall, the nonfarm orientation among the youth workers has increased over time. Non-migrant youth workers were less likely to self-select into mixed or nonfarm households than were non-migrant adult workers in 2000. By 2013, the preference pattern has changed: the non-migrant youth workers are more likely to choose mixed or nonfarm households now. This is consistent with the cohort-based results discussed previously and highlighting inter-generational story in understanding farm–nonfarm transition.

V.   SUMMARY AND CONCLUSIONS

Bangladesh experienced a major structural shift in employment between 1995 and 2010 (HIES data), as agricultural employment fell from 51.4 percent to 42.3 percent, and industrial employment rose from 12.5 percent to 23.9 percent. The rural areas also experienced similar shifts. Three major conclusions are noteworthy.

First, much of the sectoral shift in employment has been due to changes in youth employment. Thus, the share of male rural youth population (age 20 to 34 years) employed in agriculture experienced a 12.6 percentage point decrease between 1995 and 2010. By contrast, the decline in agricultural employment for adult males 35 to 49 years of age was much less, only a 0.2 percentage point decrease during the same period.

Second, analysis of pseudo-panel conditional on age-cohorts suggests that much of the farm–nonfarm transition in rural Bangladesh is occurring *between generations* as opposed to *between cohorts*. In other words, increased non-farm orientation of the youth is attributable mainly to a sharp reduction in the percentage of youth who start out in agriculture, rather than a shift by individuals from agricultural to non-agricultural employment. Thus, in 1995, 9.4 percent of rural male youths ages 20 to 34 were employed in industry, whereas in 2010, 18.7 percent of rural youths were employed in the sector. This is a 9.3 percentage point increase inter-generationally. However, based on cohort analysis, the matched extent of increase turns out to be only 3.5 percentage points over the same period.

Third, as youth's occupational choice emerged as the potent route of farm-nonfarm transition, we explored further the issue of proximate factors (robust correlates in our statistical settings) that have potential influence on the occupational choice using both HIEs and LFS data.

Statistical analysis of these surveys indicates that while there is no significant difference in the probability of non-agricultural employment between youths and non-youths in 1995, by 2010 the situation had changed such that the probability of employment in industry was 4.2 percentage points greater for youths than for adults with similar education and experience. Moreover, the analysis indicates the effects of most explanatory variables (including gender, marital status, years of schooling, number of working age men and women, and amount of land operated) are significantly different for youth as compared with adults. Nonetheless, in broad terms, higher levels of education and public investments in infrastructure that enhance the probability of non-youths to be employed in industry and services also enhance the probability of youths to be employed in these sectors, but by a higher magnitude. In short, while youth may have higher aspirations for non-farm jobs, these aspirational routes are better served by human capital (especially post-secondary education) and physical infrastructural routes (especially proximity to cities and improved access to water and electricity) associated with modernization.

Data on domestic and overseas migrants is sparse, in part because of the lack of questions in most surveys related to family members who have migrated. The available information indicates, however, that in 2010, 2.7 million men (5.2 percent of the male working age population) were migrants. The regression analysis using 2013 data indicates that individuals from households with foreign youth migrants are less likely to self-select into mixed or nonfarm households. This may suggest that to some extent, youth migration may substitute for employment in the domestic non-agricultural sector for rural households. Additional data and further analysis are needed for more definitive conclusions.

The above findings suggest two major policy implications and areas for further research. *First*, the importance of human capital investments can hardly be overemphasized during the

period of farm–nonfarm transition. Bangladeshi youth need to get not just any education but quality education, and not just general education but also *technical and vocational education* to better equip themselves for the new job market. Recent sectoral studies on the projected demand–supply gaps in the job market show that a more disaggregated approach to fostering occupation specific skills is warranted (Bangladesh MoF 2016). This applies to a range of sectors where future demand for labor has been projected, ranging from readymade garments, textile, and leather, to construction and tourism. Given the initial success of Bangladesh in attaining near-universal coverage of primary education, greater emphasis now should be given to secondary and post-secondary education. A blend of secondary education and vocational education can facilitate further entry of the rural youth in the pool of international migrants. This is especially true for the aspirant female migrant workers.

Second, the above analysis shows that there has been a considerable rise in importance of *rural* industry and service sector activities during 1995–2010 for youth employment. As the farm sector has modernized, demand for new technology and new services has also increased, triggering new growth opportunities in rural industry and service sectors. These successes need to be supported further through infrastructure development and technology access, and by inclusive finance programs (as in recent pilot projects for sharecroppers and marginal farmers supported by the central bank).

In summary, the Bangladesh economy has been transforming rapidly over the past two decades of steady overall growth. In this densely population, land-constrained country, access to land is a major determinant of sector of employment at the individual and household level. Thus, as the labor force has steadily increased, the share of youth employed in agriculture has fallen dramatically. Youth as well as non-youth will need to increasingly find employment in domestic

industry and services, as well as outside the country. Continued investments in infrastructure and education as well as expanding coverage of inclusive finance for the rural youth will be crucial for generating both rural and urban employment opportunities for Bangladeshi youth in the coming decades.

ANNEX

Table A1. Bangladesh: Migrants and adjusted population estimates, 1995 and 2010

	Males 1995	Males 2010	Percent change	Females 1995	Females 2010	Percent change
Urban (HIES)	5.92	13.18	122.6%	5.80	13.47	132.2%
Rural (HIES)	27.38	33.99	24.1%	26.88	36.30	35.0%
Total (HIES)	33.30	47.17	41.6%	32.69	49.77	52.3%
Migrants		2.66			0.14	
Projected total[a]	33.30	50.85	52.7%	32.69	49.91	52.7%
Missing (including migrants)[b]	--	3.68	--	--	0.14	--
Missing / projected	--	7.2%	--	--	0.3%	--
Migrants / projected	--	5.2%	--	--	0.3%	--

Notes: [a] The projection assumes that the working age population of men increased by same percentage as for women (52.7 percent).

[b] "Missing" is the difference between the projected total and actual (HIES) total.

Source: Bangladesh Household Income and Expenditure Survey (HIES), Bangladesh National Population and Housing Census 2010–11, and authors' calculations.

Table A2. Bangladesh: Descriptive statistics for multinomial logit regressions

	1995			2010		
	Urban	**Rural**	**Total**	**Urban**	**Rural**	**Total**
Youth (percent)	59.85	55.61	56.38	58.32	55.15	55.79
	0.49	0.50	0.49	0.49	0.50	0.50
Female (percent)	48.58	50.86	49.04	49.22	49.69	49.59
	0.50	0.50	0.50	0.50	0.50	0.50
Head (percent)	26.66	70.56	28.93	28.47	30.21	29.86
	0.44	0.46	0.41	0.45	0.46	0.46
Unmarried (percent)	29.58	80.29	21.51	27.52	19.39	21.03
	0.46	0.40	0.50	0.45	0.40	0.41
Number of years of schooling	4.66	2.30	2.73	5.18	2.59	3.12
	4.82	3.53	3.91	5.00	3.74	4.16
Number of working age men in HH	1.44	1.27	1.30	1.31	1.21	1.23
	1.79	1.63	1.66	1.67	1.57	1.59
Number of working age women in HH	1.22	1.03	1.06	1.15	1.02	1.04
	1.60	1.30	1.37	1.50	1.28	1.33
Amount of land operated HH (acres)	0.43	2.23	1.90	0.38	2.02	1.69
	1.24	3.38	3.18	1.15	3.18	2.96
HH percent having livestock	30.94	84.32	74.55	29.50	83.23	72.37
	0.46	0.36	0.44	0.46	0.37	0.45
HH percent access to improved water source	38.18	0.80	7.64	37.85	0.94	8.40
	0.49	0.09	0.27	0.49	0.10	0.28
HH percent access to electricity	78.45	12.70	24.74	81.88	18.48	31.29
	0.41	0.33	0.43	0.39	0.39	0.46
Thana percent access to electricity	68.71	14.35	24.30	72.62	20.13	30.74
	29.86	21.63	31.42	28.92	26.35	34.17
Thana percent of HH's who have no agriculture land	70.01	42.93	47.88	72.84	46.67	51.96
	19.67	19.30	22.01	19.09	20.56	22.83
Thana value of cereal production (million taka)	1.44	2.14	2.01	0.17	0.26	0.25
	1.80	1.35	1.47	0.24	0.23	0.23
Thana per capita average rural land holdings (acres)	0.34	1.70	1.45	0.32	1.57	1.32
	0.71	1.03	1.10	0.65	1.01	1.08
Thana percent of HH's under the poverty line	33.82	53.79	50.13	27.26	47.91	43.74
	22.52	23.53	24.36	22.99	25.83	26.61
Thana average years of schooling	2.91	1.51	1.77	3.40	1.82	2.14
	1.17	0.74	1.00	1.58	1.06	1.34
Travel time categories to nearest 250,000 city	1.50	2.08	1.96	1.47	2.08	1.96
	0.76	0.78	0.82	0.74	0.79	0.81

Source: Authors' calculations from multinomial regression using Bangladesh HIES data.

Table A3. Bangladesh: Multinomial logit regression for adults only (rural)

	Industry pooled	Services pooled	1995 industry	1995 services	2010 industry	2010 services
Female	0.064	0.125	0.098	0.149	0.025	0.035
	(2.95)**	(2.20)*	(3.45)**	-1.92	-0.82	-0.79
Head	-0.051	-0.034	-0.047	-0.022	-0.077	-0.047
	(3.47)**	-1.01	(2.62)**	-0.55	(4.07)**	-1.72
Unmarried	-0.02	-0.005	-0.009	-0.029	-0.099	0.093
	-0.39	-0.09	-0.18	-0.44	-1.39	-1.14
Number of years of schooling	-0.001	0.028	-0.002	0.03	0.001	0.019
	-1.24	(16.80)**	-1.17	(15.02)**	-1.38	(15.52)**
Number of working age men in HH	-0.003	0.017	-0.006	0.02	0.006	0.007
	-0.54	(2.14)*	-0.89	(2.13)*	-0.83	-0.78
Number of working age women in HH	-0.009	0.021	-0.021	0.018	0.02	0.012
	-0.87	-0.61	-1.46	-0.37	-1.2	-0.5
Amount of land operated HH	-0.02	-0.049	-0.015	-0.051	-0.068	-0.073
	(2.49)*	(5.68)**	-1.76	(5.51)**	(4.71)**	(4.48)**
HH has livestock	-0.017	-0.035	-0.017	-0.029	-0.022	-0.063
	-1.29	-1.92	-0.88	-1.19	-1.68	(3.87)**
HH access to improved water source	-0.009	0.075	-0.094	0.188	0.042	-0.015
	-0.42	-1.56	(2.44)*	(3.22)**	-1.2	-0.37
HH access to electricity	0.01	0.039	0	0.055	0.021	0.035
	-0.8	-1.79	-0.01	-1.68	-1.69	(2.23)*
Thana percent access to electricity	0	0	0.001	0	0	0.001
	-1.35	0	(2.30)*	-0.3	-1.2	-1.69
Thana percent of HH's who have no agriculture land	0.001	0.002	0.001	0.003	0	0.002
	(2.80)**	(3.29)**	(2.44)*	(3.57)**	-0.68	(3.24)**
Thana value of cereal production	-0.036	-0.145	-0.226	-0.285	-0.012	-0.053
	-1.45	(3.31)**	(2.58)*	(2.70)**	-0.45	(2.70)**
Thana per capita average rural land holdings	-0.008	0.011	0.014	0.021	-0.013	0.045
	-0.91	-0.82	-1.36	-1.35	-0.73	(2.49)*
Thana percent of HH's under the poverty line	0	-0.001	0	-0.001	0	0.001
	-0.2	(2.85)**	-0.04	(2.82)**	-0.36	-0.97

Table A3. (Continued)

	Industry pooled	Services pooled	1995 industry	1995 services	2010 industry	2010 services
Thana average years of schooling	0.004	0.027	0.01	0.034	0.004	0.009
	-0.64	(2.11)*	-1.06	(1.96)*	-0.49	-1.01
Travel time categories to nearest 250,000 city	-0.01	-0.01	-0.02	0.012	-0.007	-0.012
	-1.03	-0.58	(2.63)**	-0.76	-0.61	-1.06
Year	-0.002	-0.181				
	-0.11	(6.24)**				
N	8,282	8,282	3,323	3,323	4,959	4,959

Source: Authors' calculations from multinomial regression using Bangladesh HIES data.

Table A4. Bangladesh: Multinomial logit regression for females only (rural)

	Industry pooled	Services pooled	1995 industry	1995 services	2010 industry	2010 services
Youth	0.011	-0.034	0.006	0.024	0.069	-0.048
	-0.36	-1.05	-0.59	-1.5	-1.91	-1.44
Youth*year	0.074	-0.031				
	-1.58	-0.57				
Head	-0.139	0.063	-0.048	-0.003	-0.138	0.016
	(4.64)**	-1.81	(3.58)**	-0.17	(4.56)**	-0.45
Unmarried	0.043	-0.048	0.002	-0.066	0.106	-0.01
	-0.86	-0.89	-0.17	(4.06)**	(2.84)**	-0.24
Number of years of schooling	-0.012	0.035	0	0.03	-0.01	0.034
	(3.50)**	(9.26)**	-0.32	(17.69)**	(2.40)*	(11.13)**
Number of working age men in HH	0	0	0.003	0.009	0	0
			-0.54	-1.22		
Number of working age women in HH	-0.013	0.042				
	-0.9	(2.69)**				
Amount of land operated HH	-0.045	0.026	-0.024	-0.022	-0.055	-0.005
	(3.80)**	(2.71)**	(4.94)**	(2.61)**	(2.02)*	-0.3
HH has livestock	0.004	-0.056	-0.025	-0.036	-0.003	-0.04
	-0.17	-1.8	(2.05)*	-1.68	-0.08	-1.21
HH access to improved water source	-0.304	0.267				
	(3.53)**	(3.00)**				
HH access to electricity	0.002	-0.019	-0.024	0.049	0.055	-0.025
	-0.05	-0.39	-1.76	(2.15)*	-1.57	-0.61
Thana percent access to electricity	0.001	0.001	0	-0.001	0.001	0
	-1.52	-0.41	-1.34	-0.96	-0.66	-0.31
Thana percent of HH's who have no agriculture land	-0.001	0.001	0.001	0.002	-0.001	0.001
	-0.62	-0.51	-1.58	(3.54)**	-0.49	-0.81
Thana value of cereal production	-0.098	0.061	-0.2	-0.37	-0.114	0.031
	-1.55	-0.93	(3.48)**	(3.05)**	(2.10)*	-0.64
Thana per capita average rural land holdings	-0.057	0.044	0.001	0.019	0.029	-0.022
	-1.48	-1.48	-0.06	-1.23	-0.58	-0.55
Thana percent of HH's under the poverty line	0.001	-0.002	0	-0.001	0.003	0
	-1.15	-1.29	-0.26	(2.29)*	-1.58	-0.11
Thana average years of schooling	0.016	-0.038	-0.001	0.052	0.054	-0.025
	-0.78	-1.69	-0.09	(2.87)**	(2.44)*	-1.24
Travel time categories to nearest 250,000 city	-0.034	0.028	-0.021	-0.01	-0.001	-0.009
	-1.1	-0.82	-0.78	-0.21	-0.05	-0.31
Year	0.025	-0.139				
	-0.45	(2.06)*				
N	1,565	1,565	5,976	5,976	977	977

Source: Authors' calculations from multinomial regression using Bangladesh HIES data.

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