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# The Trends of Labor Market in Bangladesh and Its Determinants

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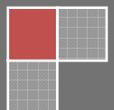
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*Submitted to:*

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## ABSTRACT

In this paper, we have tried to find out specially the features of unemployment-underemployment scenario. As we know, like *auction market* labor market is not perfectly competitive. For various heterogeneities, it has some distinct features. In Bangladesh, unemployment and underemployment problems arrive due to the lack of effective demand for labor. Hence, in this paper we desire to focus the demand determinants of labor in Bangladesh. In this case, we have emphasized on manufacturing sector, which is the emerging sector of Bangladesh economy both from the employment generation and from economic growth perspectives. To estimate the demand determinants we have used ARDL model where the estimation period is from 1980 to 2002.

## I. Introduction:

As a labor abundant country, the prospect of the entire economy of Bangladesh depends on the features of the labor market. In fact, the demand for labor is not sufficient enough to generate the job opportunity for the existing unemployed as well as underemployed workers. Consequently, the economy faces excess supply of labor. For various socio-economic reasons, market does not clear.

In the labor market, employment is determined by the supply of labor in situations of full employment. However, in situations of unemployment and underemployment, employment is determined by the demand factors. Hence, the components of the supply function and the determinations of employment need to be analyzed separately (Rahman, 1993).

Keynes believed that a certain level of *frictional unemployment* was characteristic of all labor markets (which are known as *natural rate* of unemployment); however, involuntary unemployment may arise when a condition of disequilibrium exists in labor markets, with supply exceeding demand (Hall, 1972). According to Keynesian economics, any level of unemployment beyond the natural rate of unemployment most likely due to insufficient demand in the overall economy.

The major objective of this paper is to analyze the changing features of labor market in Bangladesh. To explore the composition of labor market, in the first part of this paper, is to focus on the changing features of labor market, its trends and examine the previous study on the labor market. In the second part of this paper is to analyze the major industrial groups<sup>1</sup>, demand determinants for employee and worker separately. Then it is to suggest some policy implications.

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<sup>1</sup> See appendix-2

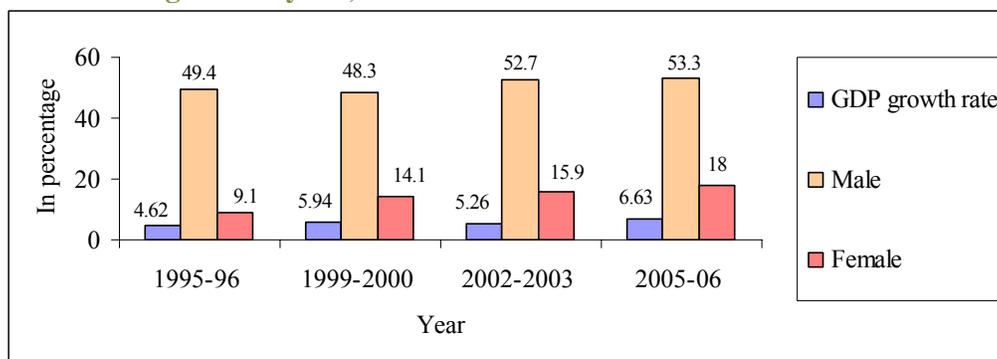
## II. The Changing and Challenging Features of Labor Market in Bangladesh

The changing features of the composition of labor force, employment, unemployment, underemployment scenario depends on various factors such as demography, structural change, change of social attitude, trends of economic activities, the macroeconomic policies initiated by private and public sectors as well as multilateral organizations specially the World Bank, IMF, United Nation. In various cases, the factors are interrelated with various aspects. In this section of this paper, we will elaborately explore the anatomy of the labor market in Bangladesh and the literature survey associated with various economies along with Bangladesh.

Chletsos, Kollias and Manolas (2000) found that the growth rate has a positive impact on the employment level; however, there is a negative relationship between employment and labor productivity. Chletsos and Markellos (2005) also GDP, exports to imports and employment level (Chletsos, 2005).

Though Bangladesh achieved GDP growth rate 6.634% in period 2005-06 compared with 5.26% period 2002-2003. *Crude activity rates* (indicates the ratio of the economically active population to the total population expressed in percentage) of male and female increase but with higher gap. Over the year, it has no significant change. Another aspect is that the unemployment rate remains almost constant at 4.3%. Figure 1 exhibits GDP growth rate and unemployment rate of population age 15 and above in Bangladesh by sex, 1995-2006.

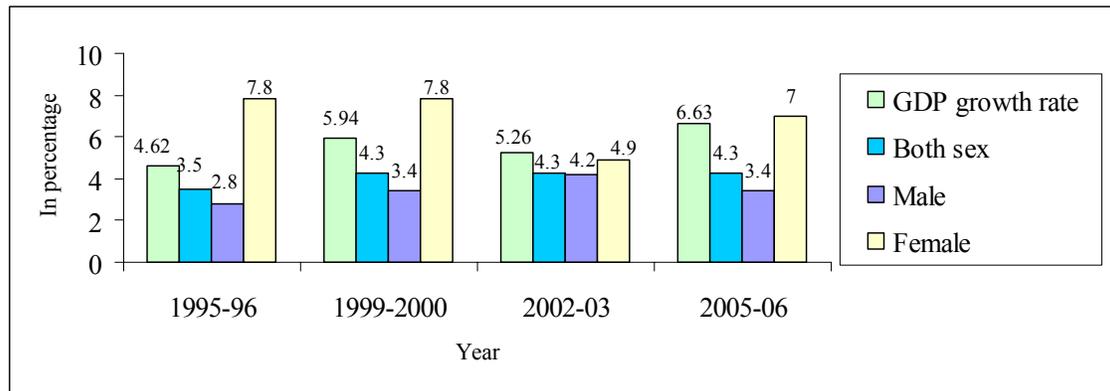
**Figure 1: GDP growth rate<sup>a</sup> and crude activity rate of population 15 years and above in Bangladesh by sex, 1995-2006**



Source: BBS: *Labour force survey* (Dhaka, GoB, Various years) *Bangladesh Economic Review* (GoB, various years)

Note: <sup>a</sup> at constant prices for year 1995-96

**Figure 2: GDP growth rate<sup>a</sup> and unemployment rate of population aged 15 and above in Bangladesh by sex, 1995-2006**



Source: BBS: *Labour force survey* (Dhaka, GoB, Various years) *Bangladesh Economic Review* (GoB, various years)

Note: <sup>a</sup> at constant prices force year 1995-96

In figure 2 unemployment rate was 3.5 percent in the year 1995-96 which was lower compare to 1999-2006. However, female unemployment rate was 7.8 percent and over the year it has been declined to 7 percent. In the year 2002-2003 female unemployment rate was low (4.9 percent) compare to other fiscal year among 1995 to 2006. In contrast to the female unemployment rate, in the 2002-2003, male unemployment rate was high (4.2 percent) compare to other fiscal years among 1995 to 2006.

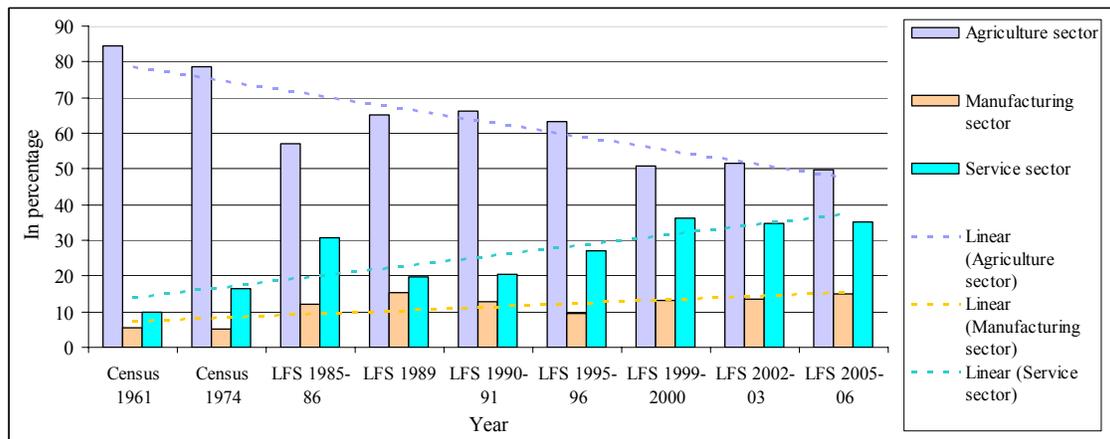
The labor force is growing faster than the employment opportunities, hence the unemployed persons increase over time. Instead of these, change of sectoral growth rate is also responsible for the rising unemployment rate. Table 1 shows that over time (2001 to 2007) the growth rate of agriculture and forestry sector is very instable, while the lion's share of labor force in Bangladesh is engaged in agricultural sector. Based on table 1, the growth rate of manufacturing sector for FY 2005-07 is 9.72 percent against 10.77 percent in the previous year. However, in 2004-2005 the growth rate was 8.19. Mainly the knitwear, ready-made garments and cotton textile fuel the growth of manufacturing. The growth of service sector also increases. Nevertheless, the rate of increment of manufacturing and service sectors is not sufficient to recruit all involuntary unemployed in these sectors.

**Table 1: Sectoral share of GDP at constant Prices (Base Year: 1995-1996) (In percentage)**

Sector	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
1. Agriculture, Forestry	-0.62	3.29	4.38	1.80	5.23	4.69
2. Fishery	2.22	2.33	3.09	3.65	3.91	4.07
3. Mining & Quarrying	4.53	7.17	7.66	8.38	9.26	8.33
4. Industry (Manufacturing)	5.48	6.75	7.10	8.19	10.77	9.72
5. Electricity, Gas & Water	7.63	8.02	9.09	8.90	7.67	2.10
6. Construction	8.61	8.09	8.25	8.31	8.31	7.01
7. Wholesale & Retail Trade	6.59	6.09	6.57	7.06	6.75	8.04
8. Hotel & Restaurant	6.92	7.00	7.05	7.12	7.45	7.52
9. Transport, Storage & Communication	6.56	6.85	6.21	7.92	7.98	8.03
10. Financial Intermediations	6.70	6.67	7.02	8.92	8.50	9.18
11. Real Estate, Renting & Other Business activities	3.42	3.52	3.58	3.65	3.69	3.76
12. Public Administration and Defense	5.92	5.24	7.06	8.02	8.15	8.41
13. Education	7.58	7.60	7.69	7.90	9.05	8.96
14. Health and Social Work	5.30	5.63	6.17	7.40	7.79	7.64
15. Community, Social and Personal Services	8.24	3.32	3.97	4.05	4.09	4.58
Growth Rate	4.42	5.26	6.27	5.96	6.63	6.43

Source: *Bangladesh Economic Review 2008*, Ministry of Finance, GoB.

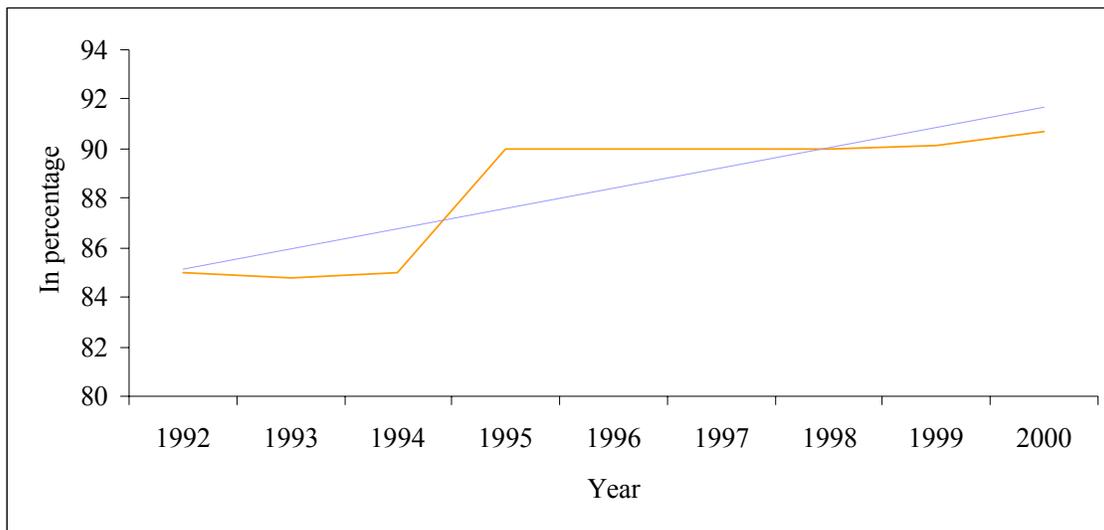
**Figure 3: Employment trend in mayor economic sector, 1961-2006**



Source: Calculated from the BBS: *Statistical Yearbook of Bangladesh*, Various years (Dhaka, GoB).

In figure 3 shows that over the year employment level in agriculture sector has been declined. In contrast to agriculture sector, employment level in manufacturing and service sectors have been increased. There exists gender variation in respect of employment by the major industry sectors (does not show in the figure). Among the male, as high as 39-27% were engaged in agriculture, forestry and related works followed by wholesale, retail trade 18.58% and manufacturing 10.88% and transport, storage and communications 10.84%. On the other hand for the females the highest 66.54% were in agriculture forestry and related works followed by 11.51% in manufacturing sector and 8.58% in other community social and personal activities, whereas in the urban area 17.33% male and 24.58% female were engaged in manufacturing sector. Therefore, the manufacturing sector is an emerging sector of employment potentials. RMG sector is also an emerging sector for female workers. Over the year, female employment rate compared to male increases in the RMG sector. Figure 4 depicts that female employment as a percentage of total employment in the RMG sector increases from 85% (in 1992) to 90.7% (in 2000) from the year 1995 to 1988 the rate was constant at 90%. But in the absolute value, female employment rises from 1218 thousand to 1500 thousand respectively from 1995 to 1998.

**Figure 4: Female employment as a percentage of total employment in the RMG sector, 1992-2000**

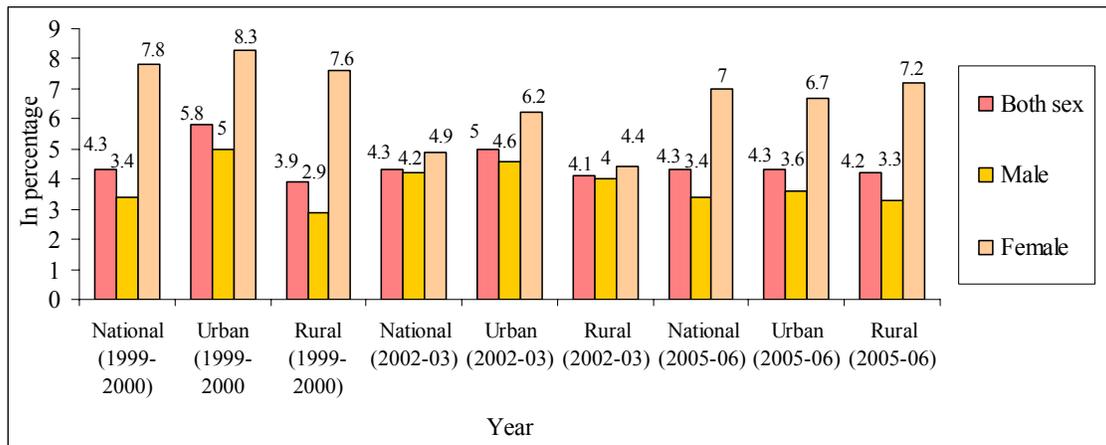


Source: Rahman, 2005

After phasing out of the Multi-Fiber Arrangement (MFA) of trade on textile and clothing, no negative impact has been felt in the sector and no worker has lost his or her job. Export data for FY 2006-07 reveals that export of knitwear and woven garments registered a growth 19.30 percent and 14.05 percent respectively compared to the previous fiscal year. In FY 2006-07, exports registered a growth of 37.39 percent in knitwear and 38.25 percent in woven garments. Government has taken several initiatives for the sustainable development of RMG sector considering its contribution to the national income and employment generation. Beside these, government allocated Tk. 20 core in the budget of 2006-07 for the purpose of creating employment through alternative training in different areas if workers lose their jobs due to negative impact in the quota-free regime.

Now it is to analyze the employment and unemployment situation by residence. Here we will specially focus on the rural areas its changing features and the empirical studies conducted on the rural labor market.

**Figure 5: Unemployment rates of population aged 15 years and over by sex and Residence, 1999-2006**



Source: BBS: *Labour force survey* (Dhaka, GoB, 2002-2003, 2005-2006)

Unemployment rates are relatively higher in urban areas compared to rural areas from 1995 to 2003. In 1999-2000, urban unemployment rates for male and female is respectively 5 percent and 8.3 percent whereas rural unemployment rate for male and female are respectively 2.9 percent and 7.6 percent. In 2002-03 figure 4 reveals the same trend in different magnitude. Instead of those trends, in 2005-2006 female unemployment rate is higher in rural area compare to urban area. In the same period in case of female unemployment in rural area however, the highest rate is observed for age group 15-19 (30.27%) followed by age group 20-24 (10.84%) and 25.29 (6.21%). In urban area, female unemployment rate is highest for age group 25-29 (10.14%) followed by age group 20-24 (10.02%) and 15-19 (9.03%). For male unemployment in both urban and rural areas, unemployment rate is highest in the age group 20-24 where the unemployment rates are 9.33 percent, 9.13 percent and 9.38 percent respectively in national, urban and rural areas.

Using OLS regression estimation Rahman (1993) examines the determinants of the hours of employment obtained by the female workers in rural areas. She finds the *human capital* variables (age, square of age, years of experience) are not statistically significant while their coefficient values are also very low. Here the relationships among dependent and explanatory

variables of human capital are negative. As their values are not significant, the author interprets that these forces are not operating in the female labor market. The location with low productivity has a significant negative coefficient. The variables reflecting recruitment cost have negative coefficients. There is a negative relationship between dependent variable and wage rate per hour. The value is statistically significant. The author concluded that expansion of employment opportunities is an urgent need since *involuntary underemployment* exists.

Ahmed (1981) has studied on the aggregate level of rural labor market. The author finds that rural unemployment is *not* involuntary largely prevalent among family workers of middle and rich farm households. Landless and land-poor wage workers do not remain unemployed even for a few days, except during natural calamities when crops and employment potentials are lost (Hossain, 1996). Hossain (1996) argues that since the rural people in Bangladesh live in village generation after generation, they know how to *adopt* and *cope* with the vulnerable situation. The author says that the rural people 'have developed various income and employment smoothing mechanisms through which they can manage to remain employed.' Over the year landlessness and near-landlessness is gradually increasing while it is neither a *necessary* nor a *sufficient condition* for rural poverty.

By using OLS estimation Hossain (1996) finds that the impact of the new technology on the rate of aggregate unemployment and under employment is negative. The relationship between agricultural real wage rate and agricultural employment is positive. Hence the over all results suggest that the new technology does not raise the real wage rate.

Hossain (1988) finds that launching the new technology affects the labor market through income effect. As income increases, rich households substitute their leisure for labor, hence, employment being redistributed from higher to lower income groups (Hossain, 1996).

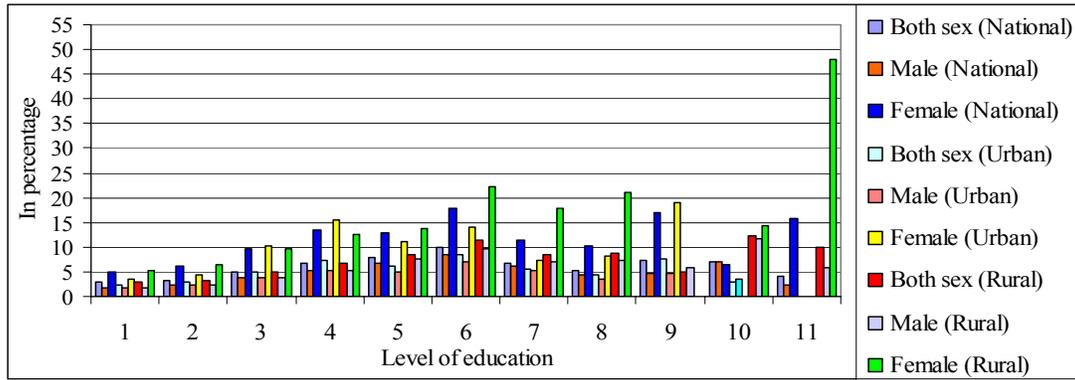
Nevertheless, Rahman (2004) finds that as the new technology (modern irrigation, seed and fertilizer) being introduced in the agriculture sector, hired labor demand is rising, while the use of machinery for land preparation leads to reduce the demand of hired labor. Hence, the net effect is difficult to predict without empirical estimation.

Due to the sectoral productivity differentials and wage differentials, in the rural labor market, labors migrate from farm to non-farm sector. The RNF sector provides a large number of employment opportunities for the growing labor force. There are intersectoral linkages that introduce the RNF sector as an emerging sector of the future growth of economy (Mahmud 1996). The RNF sector generates full-time, sustainable employment in *small-scale industry* especially for the low productive workers, which may promote the income of unskilled workers and vulnerable groups. Thus, large-scale migration to cities would be stopped and female labor force would be more benefited (Varma & Kumar, 1996).

Consequent result is that the unemployment problem is *not serious* in the rural labor market, through the underemployment rate is very high in the rural area. Therefore, the government of Bangladesh should take initiatives to promote the prospect of RNF sector for sustainable, secure as well as social standing employment opportunities.

New we would like to focus on the educated unemployed persons. Figure 6 shows the disparity of composition educated unemployment with respect to sex and residence. It shows grim picture in the sense that unemployment rate is higher along with the increase of education level. It is especially confessable for female labor force. In 2005-2006 the female unemployment rate at the education level HSC/equivalent is 22.18% followed by the unemployment rate who have technical/vocational education (20.94%) in the rural area, while in the urban area the highest unemployment rate is at the level Engineering/medical (19.02) and the second highest is at the level class IX-X (15.94%). The feature is also available in previous years. This scenario may depress the women and hence the enrollment of women for higher education will be declined.

**Figure 6: Unemployment rate of persons aged 15 years and over by level of education and residence, 2005-2006**



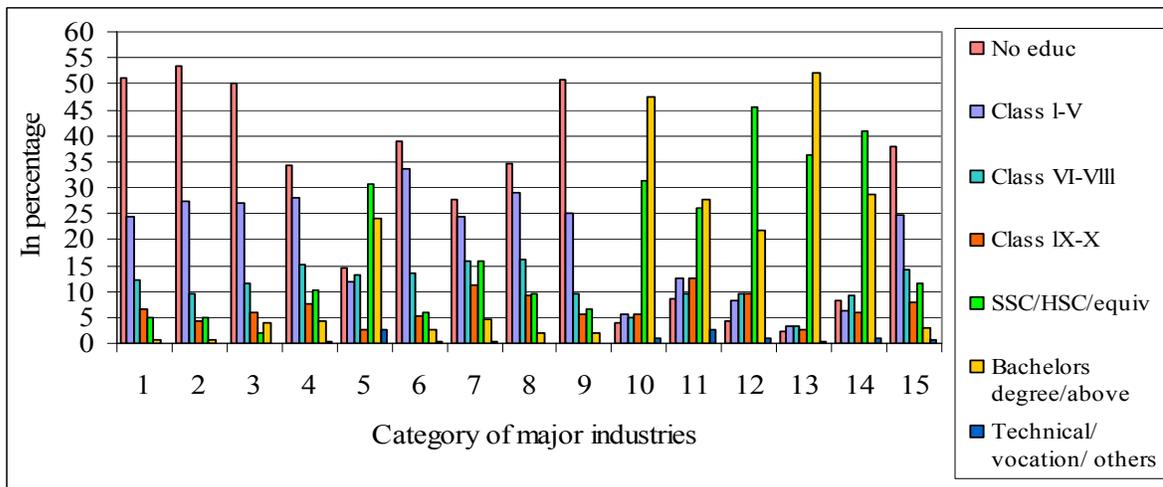
Source: BBS: *Labour force Survey 2005-2006*

Note:

1. No education	4. Class IX-X	7. Degree/equivalent	10. Technical/vocational
2. Class I-V	5. SSC/equivalent	8. Master's/equivalent	11. Other
3. Class VI-VIII	6. HSC/equivalent	9. Engineering/medical	

The feature is not quite different for male unemployment at higher level of education. Male unemployment rate is highest in case of having HSC/equivalent education level (8.58%) followed by technical/vocational education level (7.11%). Now it may suppose to relate the figure with figure 7.

**Figure 7: Employed persons aged 15 years and over by major industry and level of education, 2005-2006**



**Note:**

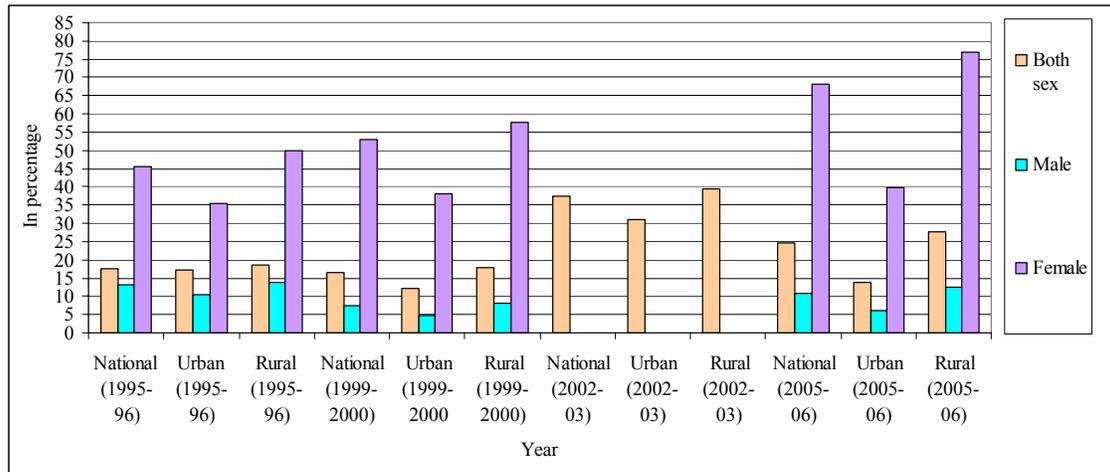
1. Agriculture, hunting and forestry	9. Transport, Storages and Communications
2. Fishing	10. Financial Intermediation
3. Mining and quarrying	11. Real State Renting, and Business Activities
4. Manufacturing	12. Public Administration and Defense
5. Electricity, Gas and Water Supply	13. Education
6. Construction	14. Heath and Social Work
7. Whole Sale and Retail Trade; Repair of Motor Vehicles, Motors	15. Other Community, Social and Personal Service Activities
8. Hotels and Restaurants	

Source: Calculated from the BBS: *Labour force Survey 2005-2006*

Figure 7 shows that in agricultural, hunting and forestry 51.15 percent employed persons have no education; in the fishing 53.29 percent employed persons have no education. Similarly in mining and quarrying, manufacturing, construction, wholesale and retail trade, hotels and restaurants, transport, storage and communications and other community, social and personal service activities sector most of the peoples who are employed, have no education. In the service sector, educated employment rate is very high. The same trend found in 2002-2003 but in different magnitude. All of the sectors where employed persons of no education level are highest in 2005-2006; the same features are found in 2002-2003, but in higher magnitude. It exhibits the potentials of educated employment prospects. Figure 2 also shows the potentials as the service sector is a growing sector.

Unemployment rate is not very high in Bangladesh labor market. Therefore, it is not a very serious problem. Instead of unemployment problem, underemployment is a serious problem especially for female labor.

**Figure 8: Underemployment rate of population aged 15 and above in Bangladesh by sex and residence, 1995-2006.**



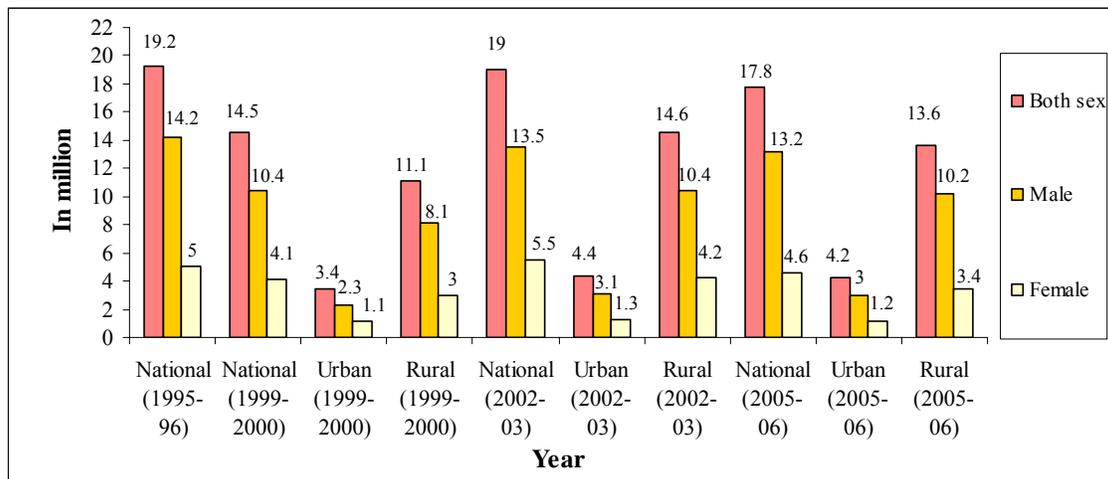
Source: BBS: *Labour force survey* (Dhaka, GoB, Various years) *Bangladesh Economic Review* (GoB, various years)

Figure 8 shows that over the year the under employment rate of female labor increases specially in the rural area. Underemployment rate of male labor declines from the year 2002-2003. In 2005-2006 10.86% males and 68.25%, females are underemployed, while 77.02% females are underemployed in the rural areas. Rahman (2005) argues that over the year unemployment and underemployment levels of male workers decline, which implies that male labors are mainly benefited from new job opportunities. This indicates that the unemployment and under employment levels of female workers will not decline until all unemployment and underemployed male workers are absorbed into the labor market. However, there may strengthen other concept named '*prisoner's dilemma*'. Eastman (1998) shows a prisoner's dilemma in which employees have incentives to work more than the optional level of hours. Because they think, it may induce his (or her) position in the work place. According to data available in 2005-2006, 41.50 percent male workers work more than 60 hours in a week in the urban area. 15.86 percent female workers work more than 60 hours, 12.71 percent female workers work 50-59 hours. Since both employers and employees know about the existing surplus labor (high unemployment and underemployment level) in the

labor market of Bangladesh, *insiders* try to convince their employers providing more effort. Hence, the *outsiders* are deprived. Otherwise, more job opportunities may be created. In this case, work-sharing program may be introduced (Freeman and Gottschalk, 1998).

Now we will focus youth labor force (15-29 age). Youth labor force is another important aspect of the labor market of Bangladesh. The growth of youth labor force is *instable*. In 1995-1996, it was 19.2 million, in 1999-2000 declined to 14.5 million, then increased in 2002-03 and however declined in 2005-06. In figure 9 we find the variation of youth labor force growth in urban and rural areas. In the rural areas youth labor force is more compared to the urban area. Gender differentials also exist over the year.

**Figure 9: Youth labor force (aged 15-29) by sex and residence**



Source: BBS: *Labour force survey* 2002-2003, 2005-2006.

Among the employed youths, 43.95 percent are belonging to agriculture followed by service sector 36.39 percent and manufacturing sector 19.67 percent. In 2002-2003 among the youth labors literate male participation was 61 percent and female participation was 54.1 percent, but the magnitudes decline to 36.22 percent and 44.05 percent respectively. In the later case, literate female participation rate increases both in urban and rural areas compare to literate male.

Major Key findings of this section are that the labor market of Bangladesh is consistent with Lewis *two-sector model* from various aspects. There is surplus labor in the rural economy, (as the figure 5 and 8 show), the productivity differentials increase between rural and urban areas and the sectoral wage differentials (see appendix 1) also exist in agriculture, manufacturing and service sectors. The growth of output and employment increases in the manufacturing and service sectors. In contrast, the unemployment rate is high in the urban areas. Because the growth of manufacturing sector is not sufficient to absorb the surplus labor prevailed in the urban economy.

In fact, manufacturing sector is an emerging sector for Bangladesh economy. The *special characteristics of manufacturing sector* are:

- Manufacturing growth “pulls along” economic growth in such a way that other sectors cannot operate like that sector. This argument is reflected in Table 1.
- “*Learning by doing*” concept is more relevant as well as more important in industry than in agriculture or services. Learning by doing, innovation and intersectoral linkages hence render overall productivity growth endogenous to growth in dynamic manufacturing sectors.
- The technological change is generally initiated in the manufacturing sector then it is diffused out of the sector.
- The manufacturing sector and service sector are interlinked which is the critical point for Bangladesh labor market since the trend of employment rate in service sector is upward over the year (see figure 3). The growth and increasing sophistication and specialization of manufacturing may induce the demand for service inputs into manufacturing sector (Tregenna, 2008).

For these district features of manufacturing sector in the next section, we will try to estimate the demand determinants of labor in major industry groups. The econometric technique used in this paper is ARDL (Autoregressive Distributed Lag Model).

### III. The Demand Determinants of Labor in Major Industry Groups

In this section, we will estimate the demand determinants of employee and production worker separately who works in the selected major industry groups. To avoid severe *multicollinearity* problem, complexity and from the principles of parsimony, some variables are omitted from the model and their *proxy* variables are incorporated in the model in some cases. Beside these the unavailability of time series data of relevant factors restricts the number of explanatory variables.

To estimate the demand determinants of employee, the following log linear model is constructed:

$$\ln em_t = \beta_0 + \beta_1 \ln em_{t-1} + \beta_2 \ln reicost_t + \beta_3 \ln rwicost_t + \beta_4 \ln fasset_t + \beta_5 \ln rfac_t + \beta_6 \ln vprod_n_t + \beta_7 \ln vprod_n_{t-1} + \beta_8 \ln rimex_t + \beta_9 \ln pw_t + \beta_{10} \ln pw_{t-1} + u_t$$

Where:

$em_t$  = average annual employee in t period

$em_{t-1}$  = average annual employee in t-1 period

$pw_t$  = average annual production worker in t period

$pw_{t-1}$  = average annual production worker in t-1 period

$reicost_t$  = ratio of employment cost of employee and total industrial cost in t period

$rwicost_t$  = ratio of employment cost of production worker and total industrial cost in t period

$fasset_t$  = Fixed assets in t period

$rfac_t$  = number of reporting factories in t period

$vprod_n_t$  = gross value of industrial production in t period

$vprod_n_{t-1}$  = gross value of industrial production in t-1 period

$rimex_t$  = ratio of import and export in t period

Given the availability of data, the log linear model is estimated for the period 1980-2002.

Table 2 reports the regression results.

**Table 2: Regression results for employee**

<i>Dependent variable: Natural Log of number of employee</i>			
<b>Regressors</b>	<b>Coefficients</b>	<b>Standard Error</b>	<b>T-ratio</b>
lnem <sub>t-1</sub>	-0.15674	0.41	-0.38
lnreicost <sub>t</sub>	0.152261	0.42	0.36
lnrwcicost <sub>t</sub>	-0.37129	0.40	-0.93*
lnfasset <sub>t</sub>	-0.09427	0.19	-0.48
lnrfac <sub>t</sub>	0.114965	0.12	0.96*
lnvprod <sub>t</sub>	0.099156	0.34	0.29
lnvprod <sub>t-1</sub>	0.39702	0.38	1.04*
lnrimex <sub>t</sub>	0.51904	0.24	2.18****
lnpw <sub>t</sub>	0.44237	0.44	1.00*
lnpw <sub>t-1</sub>	0.05132	0.26	0.19
Constant	-3.1266	2.07	-1.55**
$R^2=0.99$ ; $\bar{R}^2=0.98$ ; observations =18			

Note: \*, \*\*, \*\*\* \*\*\*\* denote one tailed significance at 0.25, 0.10, 0.05, 0.025 probability levels respectively.

To estimate the demand determinants of production worker, the following log linear model is formed:

$$\ln pw_t = \alpha_0 + \alpha_1 \ln em_t + \alpha_2 \ln reicost_t + \alpha_3 \ln rwcicost_t + \alpha_4 \ln fasset_t + \alpha_5 \ln rfac_t + \alpha_6 \ln vprod_t + \alpha_7 \ln vprod_{t-1} + \alpha_8 \ln rimex_t + \alpha_9 \ln pw_{t-1} + \alpha_{10} \ln em_{t-1} + v_t$$

Where:

$pw_t$  = average annual production worker in t period

$em_t$  = average annual employee in t period

$em_{t-1}$  = average annual employee in t-1 period

$pw_{t-1}$  = average annual production worker in t-1 period

$reicost_t$  = ratio of employment cost of employee and total industrial cost in t period

$rwcicost_t$  = ratio of employment cost of production worker and total industrial cost in t period

$fasset_t$  = Fixed assets in t period

$rfac_t$  = number of reporting factories in t period

$vprod_t$  = gross value of industrial production in t period

$vprod_{t-1}$  = gross value of industrial production in t-1 period

$rimex_t$  = ratio of import and export in t period

By using the available data for the period 1980-2002, the log linear model is estimated. Table 3 reports the regression results.

**Table 3: Regression results for production worker**

<i>Dependent variable: Natural Log of number of production worker</i>			
<b>Regressors</b>	<b>Coefficients</b>	<b>Standard Error</b>	<b>T-ratio</b>
lnem <sub>t-1</sub>	0.28	0.28	1.00*
lnreicost <sub>t</sub>	-0.50	0.28	-1.74***
lnrwicost <sub>t</sub>	-0.009	0.34	-0.03
lnfassect <sub>t</sub>	-0.15	0.15	-1.02*
lnrfac <sub>t</sub>	0.16	0.08	1.91***
lnvprodn <sub>t</sub>	0.42	0.22	1.94***
lnvprodn <sub>t-1</sub>	-0.19	0.32	-0.61
lnrimex <sub>t</sub>	-0.24	0.23	-1.04*
lnpw <sub>t-1</sub>	0.04	0.21	0.21
lnemw <sub>t-1</sub>	0.28	0.31	0.89*
Constant	0.85	1.89	0.45
$R^2=0.99$ ; $\bar{R}^2=0.99$ ; observations =18			

Note: \*, \*\*, \*\*\* \*\*\*\* denote one tailed significance at 0.25, 0.10, 0.05, 0.025 probability levels respectively.

According to the estimated value given in table 2 there is a negative relationship between the recruitment in current year and previous year. It may economically significant in various aspects, Table 2 shows that employee and production worker are *not substitute*, rather they are *complementary*. For the improvement of productivity, technology, the coefficient of the ratio of employment cost of employee and total industrial cost hold positive sign with lower magnitude. It should be mentioned that in fixed assets land and improvement to land, buildings, plant and machinery, transport and equipments are included. Hence, the coefficient value of fixed assets partially shows the *substitution effect* that is negatively affect recruitment of employee. But it is not statistically significant. From previous studies, it is known that capital and *blue-collar* or unskilled workers are generally substitutes for each

other in production, however capital and skilled or *white collar* workers tend to be complements. (Kaufman and Hotchkiss, 2003) But here we cannot explicitly provide any evidence that support this hypothesis. The reason is that in this case blue-color and white-color employees are *jointly* represented. As the number of factory rises, employment prospect of employee also rises. The coefficients of production and its lagged value show that as the production increases, enrollment also increases. The coefficient of import - export ratio shows that if the *trade balance* is deteriorated, eventually it has no negative impact on employee.

Table 3 specially represents the demand determinants of blue-color or unskilled workers. It is sensible that recruitment of operative increases with employee. The coefficient sign of the ratio of employment cost of production worker and total industrial cost is negative which reflects that if government of Bangladesh implements *minimum wage law*, some operatives may loss their jobs. As the fixed asset increases, the demand for unskilled or semi-skilled worker declines accordingly. The coefficient of lagged value of production holds negative sign, which implies that if the industry makes any *inventory*, it will lead to hire fewer workers. In contrast to employee, if the trade balance is deteriorated, eventually it may lead to fire a number of workers. Finally, the recruitment of employees and operatives in the lagged year does not generate any negative impact on the demand for operative in the current year contrary to the fact, if the enrollment of employees rises 1 percent in the lag year; the demand for worker also rises by 0.28 percent.

The major findings of this section is that the employees who are engaged in the major industry groups enjoy sustainable and secured jobs; while the operatives' employment position is very insecure. In the globalize economy the unskilled workers suffer more if the trade balance become deteriorated.

#### IV. Conclusion and Policy Implications

As we have seen, the labor force participation over the year increases but job opportunity does not increase in such a way that the country can absorb all the additional labor force. So the focal point is to create the job opportunities. Keeping this in mind the policy should include the following strategies:

- Since the underemployment rate is very high, especially in the rural area and (as we have seen) the RNF sector has the prospect to absorb the unskilled and semi-skilled labor force, so the government should undertake specific policy measures to induce the RNF sector. For this, rural infrastructure should be developed. As the SMEs' (small and medium enterprises) production technique is especially *labor intensive*, so providing loans, training and other facilities government can strengthen SMEs.
- Government may introduce a work-sharing program and fix maximum working hours that will reduce unemployment, underemployment rate in some extent.
- As the demand for labor is *derived demand*, if the government can accelerate the economic growth rate using the macroeconomic components, labor demand will increase as well.
- Government may take proper steps to encourage the labor force to migrate overseas. This procedure may induce the GNP growth rate that will lead to further job opportunities in the country.
- As we have found that import-export ratio and unskilled labor demand is negatively related, hence, if the government takes initiatives to improve the trade balance, it will generate more job opportunities.
- Investment in the service sector and manufacturing sector should be encouraged. Government should take proper steps to prevent the *capital flight* to overseas. We have found that as the number of factories rises, labor demand also rises.

- ILO studies suggest that governments ought consistently to incorporate the use of “*labor-based*” rather than “*equipment-based*” production procedure in the public investment policy (Islam, 2005)
- As the reservation wage of the labor in Bangladesh is very low, Bangladesh government may urge foreign investors to invest in Bangladesh.
- Since the influence of demand determinants on the demand of skilled and unskilled labor force is different, so policymaker must consider these features.

After all not only the government of Bangladesh, but also NGOs as well as other organizations such as political, social, national and international should jointly or separately take proper steps to eradicate poverty, unemployment and underemployment as well.

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## Appendix

### Appendix 1: Marginal productivity differentials in various sectors

In the *short run*, it is assumed that labor is only *variable* input. If the firm uses two factors such as labor and capital, the firm's profit is given as follows.

$$\Pi = P \cdot Q - W \cdot L \quad (\text{A. 1})$$

Where  $\Pi$  represents profit,  $P$  is the product price (assumed fixed for *perfect competition* in the product market),  $Q$  is the level of output,  $W$  is the wage rate (assumed fixed for perfect competition in the labor market), and  $L$  is the level of employment.

If the production function is:

$$Q = F(K, L) \quad (\text{A.2})$$

Replacing  $Q$  with the production function:

$$\Pi = P \cdot F(K, L) - W \cdot L \quad (\text{A.3})$$

The firm maximizes profit (A.1) by choosing how much of each factor to use. To obtain the level of employment that maximizes profit, partially differentiating (A.3), then the first-order condition is:

$$P \frac{\partial F}{\partial L} - W = 0 \quad (\text{A.4})$$

The term  $(\partial F / \partial L)$  represents the *marginal product of labor* ( $MP_L$ ). In case of perfect competition,  $P$  is equal to *marginal revenue* (MR) and for *imperfect competition*,  $P$  is greater than MR. However,

$$W = P \cdot \frac{\partial F}{\partial L} = P \cdot MP_L \quad (\text{A. 5})$$

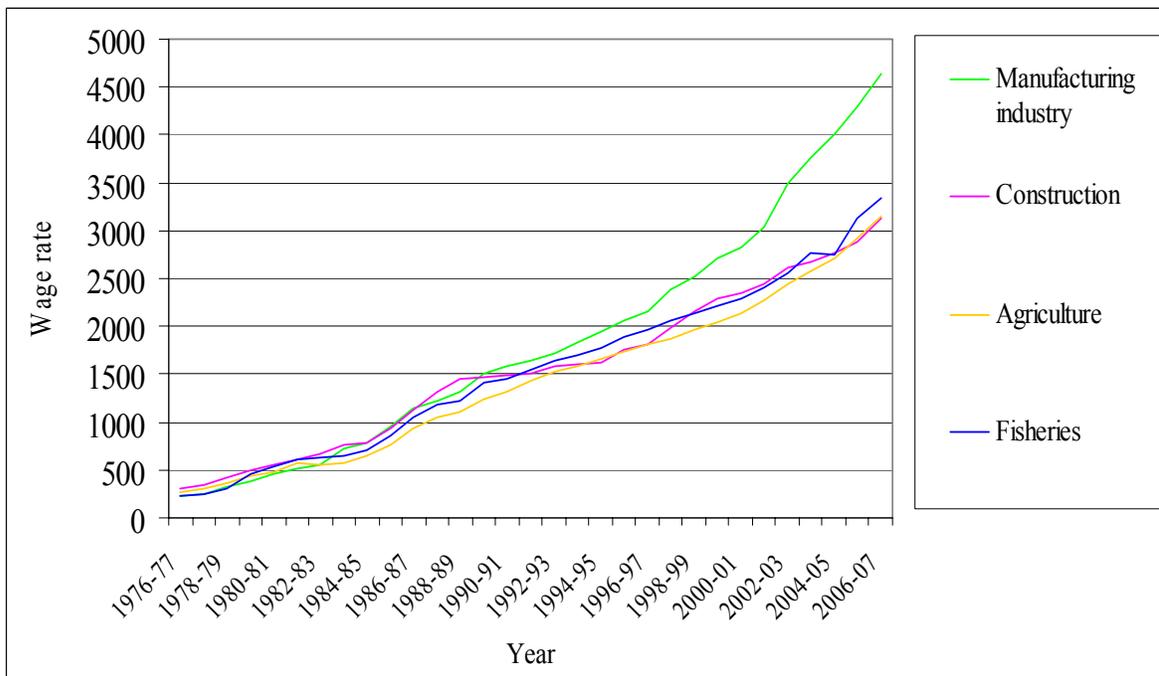
$$\text{or, } W = MR \cdot MP_L = MRP_L \quad (\text{A. 6})$$

where  $MRP_L$  represents *marginal revenue product* of labor. For *long run* demand function, it is also found that

$$W = P \cdot MP_L$$

Therefore, the wage differentials in different sectors of production reveal the variation of productivity in these sectors where higher wage rate indicates higher productivity.

**Figure A.1: Nominal wage rate by sector (19976-2007) (Base: 1969-1970 = 100)**



Source: BBS: *Statistical yearbooks*, various years.

Figure A.1 shows that in manufacturing sector the marginal productivity of labor is increases over the year. The increment of marginal productivity of labor in agriculture sector also increases but with lower magnitude i.e.,  $MP_L$  in manufacturing sector is *greater* than the  $MP_L$  in agriculture sector.

## Appendix 2: List of major industry groups

The major industry groups that have been considered to estimate the demand determinants of labor in manufacturing sector, shows in table A 1. The data has been obtained from *Statistical Yearbooks* of Bangladesh Bureau of Statistics in various years.

**Table A. 1: Major industry groups**

BSIC 1986 code	Title of Category	BSIC 1986 code	Title of Category
311-312	Food manufacturing	354	Petroleum refining
313	Beverage industries	355	Misc. prod. of petroleum & coal
314	Tobacco manufacturing	356	Rubber products
315	Animal feed	357	Plastic products
321-322	Mfg. of textiles	361	Pottery & China-ware
323	Wearing apparel except footwear	362	Glass & glass products
324	Leather & leather products	369	Non-metalic mineral products
325	Leather footwear	371-372	Iron & steel basic industries
326	Ginning & processing of fibers	381-382	Fabricated metal products
327	Embroidery of textile goods	383	Non-electrical Machinery
331	Wood & cork products	384	Electrical machinery
332	Furniture & fixtures (wooden)	385	Transport equipment
341	Paper & paper products	386	Measuring Instruments
342	Printing & publishing	387	Photographic & optical goods
351	Drugs & pharmaceuticals	391	Decorative
352	Industrial chemicals	392	Sports & athletic
353	Other chemical products	393-394	Other Mfg. Industries

Source: BBS: *Statistical yearbooks*, various years