

Productivity and Agricultural Real Wage in Bangladesh: 1959-60 to 2012-13

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The trend of the real wage of agricultural labourers in Bangladesh during the last half a century was influenced by two opposing forces: technological changes that raised the productivity of the farm land through high yield crops and multiple cropping, which also raised the productivity of labour, and a rapid growth of agricultural labour supply working in the opposite direction. This resulted in the stagnation of real wages for nearly four decades. Only when the addition to agricultural labour supply became persistently negative around the middle of the first decade of the new millennium, did the real wage show a trend increase.

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JEL Classification: O33, Q15, Q16

I. INTRODUCTION

A large section of the agricultural labour force of Bangladesh depends on wage employment for livelihood. Most of these people are relatively poor. Hence, agricultural real wage has important implications for the well-being of a significant section of the rural population. Not surprisingly, it was one of the earliest research topics of agricultural and development economics of the country.

The estimation of the agricultural real wage in Bangladesh has been a controversial issue. Part of the controversy was centred on what price index to use to estimate the real wage from the nominal wage data. Since the estimates of the government statistical agencies did not seem credible or relevant, some authors

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arbitrarily chose or constructed their own price indices in order to estimate the real wage.¹ This led to some differences in the estimate and its trend. However, regardless of the methods of estimation of the real wage, it was evident that there was a sharp fall in the real wage in the wake of the liberation war (1971) reaching its lowest level during the catastrophic famine of 1974, and then a very slow trend increase over the next decades.² There have been few attempts to explain the possible reasons for this particular trend of the real wage. The preoccupation with the estimation and the trend of the real wage and its implication for poverty prevented an investigation into the reasons of the idiosyncrasies of the real wage movement.

This paper makes an attempt to fill in this lacuna in the literature by analysing the factors that could have generated the particular path that the agricultural real wage in Bangladesh traced out over the post liberation years. Neoclassical theory of production suggests that the real wage of any sector must be closely related to the productivity of labour in that sector. A number of papers have performed econometric exercises to show that the real wage was strongly related to agricultural productivity variously defined.³ Less attention was paid to why the productivity behaved in the particular way to generate the observed path of the real wage. This paper tries to answer this question with a production function approach.

II. AGRICULTURE IN BANGLADESH ECONOMY

Agriculture is the primary sector of an economy. It makes two important contributions: it provides food (and organic raw materials) for the population and it provides employment for a major part of the labour force. During the early phases of economic development most of the labour force finds employment in agricultural and related activities. As other sectors grow with economic development, the share of the labour force engaged in agriculture starts declining, and that of industry and service sector rises. This trend is so common that sometimes the stage of economic development of the country is expressed in

¹For examples, see Bose (1968), Khan (1984) and Islam and Taslim (1996).

²The agricultural real wage actually started declining from before the liberation war, but accelerated greatly after the war. According to the research of Khan (1984), agricultural real wage has been falling for more than a century.

³Interestingly, productivity was defined mostly in terms of productivity of land. See Boyce and Ravallion (1991). Land productivity need not have a definite relationship with wage.

terms of the fraction of the labour force engaged in agriculture or the share of national income originating therein. These ratios for Bangladesh are shown in Table I.

The shares of agriculture in both total labour force and GDP have steadily declined underlining the structural change with the economic development of the country during the past decades. Agriculture accommodated nearly four-fifths of the labour force during the early 1970s. By 2012-13, the share came down to well below one-half. Over three-fifths of GDP originated in the agricultural sector four decades ago, but now the share is less than one-sixth. However, this decline in the importance of agriculture in the national economy did not mean a reduction in either agricultural output or employment. On the contrary, the output of the agricultural sector grew quite robustly. Cereal output (rice and wheat) that stood at only 10 million tons in 1972-73 increased more than three and half times by 2012-13. This kept the economy well-supplied despite a doubling of the population. Employment in agriculture increased from less than 17 million in 1974 to nearly 26 million in 2010—a substantial increase in agricultural employment, but much less than the increase in population.

The large concentration of the country's labour force in agriculture during the earlier decades, buttressed by casual empiricism, led to the oft-repeated conclusion that there was a large surplus labour force in agriculture, or for that matter in the economy. Visible unemployment was much less; the economic imperatives and socio-cultural mores were such that the surfeit of labour gave rise to disguised unemployment or underemployment rather than open unemployment. While unemployment rate is officially estimated at only 4.3 per cent, the underemployment rate is estimated at about one-fifth of the labour force.⁴

III. REAL WAGE WITH SURPLUS LABOUR

A pioneering study of the process of development in an agrarian economy with surplus labour was done by Arthur Lewis (1954). He hypothesised that the economy of a poor developing country, especially of Asia, was characterised by a large agricultural sector with “unlimited” supply of labour. The presence of surplus labour put a cap on both agricultural and non-agricultural real wage. Market forces drove down the agricultural real wage to a subsistence level.⁵ The

⁴ BBS, *Labour Force Survey 2013*. Many people believe this to be a gross underestimate.

⁵ According to Lewis, the supply of labour is unlimited if the supply of labour at the subsistence wage exceeds the demand for labour.

nascent industrial sector could draw on the pool of surplus labour at this low wage.

TABLE I
SHARE OF AGRICULTURE IN LABOUR FORCE AND GDP (PER CENT)

Fiscal year	Agricultural labour force (million workers)	Share of agriculture in labour force (percent)	Share of agriculture in GDP (percent)	Agricultural output (crore taka at constant 1995-96 prices)	Total production of rice and wheat
					('000 tons)
1972-73	20.5	-	57.9	29,273	10,023
1973-74	21.0	78.5	58.4	27,185	11,721
1974-75	21.5	77.2	62.5	23,445	11,108
1975-76	22.1	-	53.4	28,940	12,776
1990-91	31.8	66.3	29.5	37,683	18,789
1999-00	32.5	50.8	24.6	50,427	24,907
2005-06	33.2	48.1	18.0	59,853	27,265
2010-11	32.5	47.5	16.8	74,397	34,514
2012-13	32.2	45.1	16.2	78,600	35,159

Source: *Labour Force Survey and Monthly Economic Trends*, various issues.

The profits of industries were reinvested such that the productivity of labour increased in the industrial sector. But since the wage rate was tied to the agricultural sector due to inter-sectoral mobility of labour, it remained low thereby raising the profit rate in the industrial sector. The higher profits were reinvested to further increase the capital stock, which raised the profitability of the sector. The process continued until the surplus labour was exhausted. Beyond this point, the industrial sector had to compete with the agricultural sector for labour which resulted in an increase in the real wage rate. Thereafter, the expansion of either the industrial or the agricultural sector or both could be achieved only at the expense of higher wages. Lewis termed this stage of development as the “turning point.”

Lewis’ argument can be cogently illustrated with the help of Figure 1. Employment in manufacturing (non-agricultural) sector is measured from O_M rightward and employment in agricultural sector from O_A leftward. The initial supply of labour is $O_M O_A$ and the subsistence wage is $O_M W$. The marginal product of labour in manufacturing is shown by lines marked MP_i and that in agriculture by FG . Labour market equilibrium requires that the marginal product of labour is set equal to the wage rate in both sectors.

Initially, the agricultural equilibrium is at D at which agriculture absorbs $O_A L_1$ amount of labour at the given subsistence wage. The manufacturing sector

amount. Both sectors attain equilibrium at E. Further increase in productivity of labour in manufacturing will raise the wage rate even higher. Thus beyond D, the labour market becomes competitive in the ordinary sense. Any increase in demand for labour will raise the wage rate to equilibrium allocation of labour between the two sectors. Lewis had termed D as the “turning point” in the development process.

For expositional reason, it has been assumed that there is no change in productivity of labour in agriculture. This is not essential; as long as the increase in the demand for agricultural output and the increase in productivity of labour in agriculture are not sufficient to prevent manufacturing from increasing employment, the arguments above will apply. It is well-known that in most developing economies labour productivity in the manufacturing sector exceeds that in the agricultural sector.⁶ Similarly, the supply of labour needs not be constant. As long as there is surplus labour, the arguments above hold. It is also possible to allow for a Harris-Todaro type divergence between agricultural and industrial wage without affecting the principal arguments.

How soon the turning point is achieved depends on how rapidly the marginal product of labour in industry rises and how fast the total labour force increases. A rapidly increasing population could increase the labour force sufficiently to ensure that despite significant industrial progress the turning point is not achieved for a long time. There is some evidence that this has happened in Bangladesh.⁷

IV. REAL WAGE IN BANGLADESH AGRICULTURE

Some authors have found relevance of Lewis model for the economy of Bangladesh.⁸ Throughout the first three decades of its existence, its agricultural sector was dominated by subsistence farms and the supply of labour was plentiful. Although there is strong evidence that agricultural wage hardly increased during the first three decades of Bangladesh’s existence over what existed before the liberation war, there was considerable fluctuations within this period. This is shown by the three real wage lines in Figure 2. There is some controversy regarding how the real wage index should be constructed. The controversy arises from the use of different deflators such as Consumer Price

⁶For example, average productivity of labour in agriculture and industry (sectoral value addition/sectoral labour force) in 2010 worked out to be Tk. 28,948 and Tk. 102,212 respectively, according to Bangladesh Bureau of Statistics (BBS) data.

⁷See Taslim and Islam (1996).

⁸X. Zhang *et al.* (2014) and Taslim (2014).

Index (CPI) or the price of coarse rice. *Bangladesh Economic Review*, published each year by the Ministry of Finance at the time of presenting the annual budget, provided (until 2016) both nominal and real wage indices of hired labourers by several categories of labour. However, *Review's* agricultural real wage data are available only from 1977-78 and cease inexplicably at 2008-09. The real wage estimated under different choices of the price index is shown in Figure 2. The data underlying two of the real wage lines in Figure 2 were taken from Islam and Taslim (1996) and *Bangladesh Economic Review*. To derive a single series for the entire period, the data on the GDP deflator and CPI estimated by Bangladesh Bureau of Statistics (and used by *Bangladesh Economic Review*) with different base years were re-estimated with respect to a single base year 1969-70 by splicing them using the growth rates of the nominal indices. Two agricultural real wage indices in the figure for the entire period were derived by using these estimated GDP deflator and CPI (general) with the nominal wage, while the third index for the period 1977-78 to 2008-09 is the BBS estimate.

Several authors have used (coarse) rice price to derive real wage of agricultural workers.⁹ We have not considered agricultural real wage with rice price or food price index as the deflator for two reasons. First, what is germane to the argument here is what the labourers are paid in real terms. Food and beverage accounted for about 65 per cent of the income of the lower income groups and these groups spent about 40 per cent of their food and beverage expenditure on rice (*Household Income and Expenditure Survey 2010*). Hence, rice accounted for only slightly over one-quarter of the income of the households at the lower half of the income distribution in rural Bangladesh. Spending on coarse rice could not have been more than this fraction. Therefore, exclusive focus on (coarse) rice price could bias the wage index unless non-rice commodity prices rose at the same rate as the rice price. The method used by the Bangladesh Bureau of Statistics to construct the real wage indices is not readily available, but it seems the agricultural real wage was constructed by using agricultural price index as the deflator. There is some difference between the agricultural real wage index constructed by Bangladesh Bureau of Statistics and the other two estimated indices shown in the graph. The former is almost identical to CPI based real wage throughout the late 1970s and 1980s, but since the early 1990s the BBS estimate diverged from the other two. The divergence accelerates markedly in the

⁹ See Khan (1984) for example.

new millennium, which raises some suspicion. However, the broad trends of all the indices are similar: a sharp drop in the real wage during the early years of liberation and a slow trend increase to its pre-liberation level, which is attained during the first half of the first decade of the new century, and a strong pick up thereafter. The analysis below is based mostly on the taka real wage estimated by adjusting for CPI.

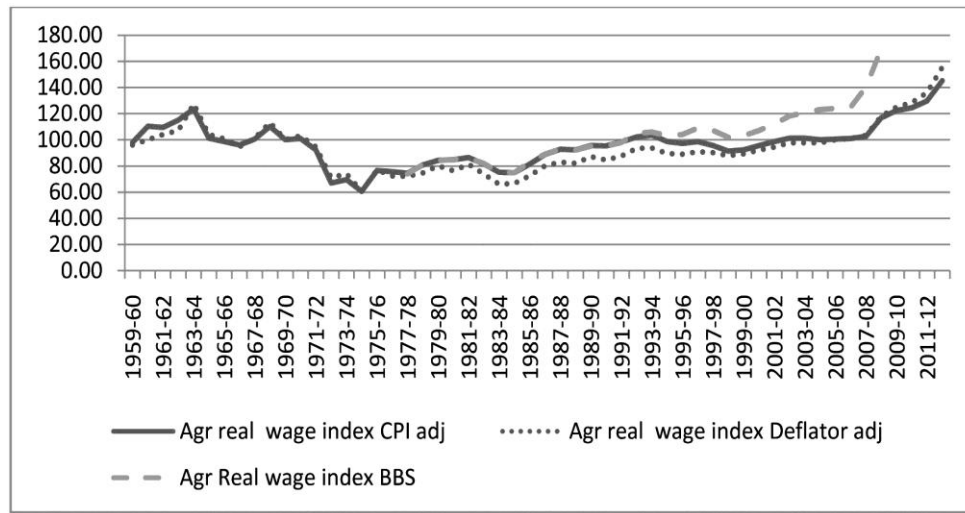
The agricultural real wage suffered a very large drop in the aftermath of the liberation war. Between 1970-71 and 1974-75 the real wage declined by a whopping 43 per cent. To jog memory, a horrific famine had struck the nation in 1974-75 that resulted in the deaths of hundreds of thousands of people due to starvation and related causes. The very sharp decline in the real wage, caused largely by very large increases in the food prices, especially rice prices, and the paucity of employment opportunities, must have been the major contributor to the misery of the people trying to recover from the devastation of the liberation war.

V. SUBSISTENCE WAGE

The large drop in the real wage after 1971 raises the question if the assumption that the real wage was at the subsistence level in the earlier period is tenable. If subsistence level is defined in terms of a stable minimum requirement to survive, obviously the assumption must be incorrect. But if it is more broadly defined as a minimum standard of living conditioned by biological needs to maintain health, and social and cultural situation of the poor, then a temporary reduction in the minimum level is possible.¹⁰

¹⁰This was also argued by Bose (1968): "It is more appropriate to think that the subsistence level means the conventional minimum standard of living, and not the minimum calories and the minimum clothing required for survival. This conventional standard of living may be depressed at times by the pressure of circumstances. A simple example is the possible reduction in consumption level as a result of two or three successive crop failures." p.473.

Figure 2: Agricultural Real Wage Index, 1969-70=100



However, we hope to avoid the controversy by focusing on surplus labour rather than subsistence wage. It seems reasonable to assume that with surplus labour in agriculture it is not possible for the real wage to rise sustainably. We recognise that it is also not possible for the real wage to remain much below the subsistence wage for more than a short period without serious consequences on health. There was a sharp upturn in the real wage after the famine year lending some credence to the view that the real wage might have been depressed below the minimum subsistence level for a short period.

Agricultural real wage rose by fits and spurts since 1974-75, but it did not attain the pre-liberation level until 1992-93 according to the CPI adjusted real wage index. However, it fell below the pre-liberation level again in 1994-95 and did not rise above that level until 2002-03. Both the CPI and GDP deflator adjusted indices and taka wage indicate that the agricultural real wage was equal or above its 1969-70 level from 2005-06 onward. Thus it took about *three and half decades* for the agricultural real wage to recover to the pre-liberation level. The supply-demand balance of the labour market did not warrant an increase in the wage rate during this long period.

VI. LOW REAL WAGE AND THE EXPANSION OF MANUFACTURING

The period of depressed agricultural wage witnessed the rise of the manufacturing sector led by the readymade garments (RMG) industry. This stage of economic history of the country fits the Lewis model rather well and a number of authors have made reference to this model to explain economic development of the country. The low real wage, together with quotas and duty free access to most developed country markets, afforded large profits for the RMG entrepreneurs. These were ploughed back into the industry such that the industry grew rapidly in terms of both turnover and employment as envisaged by Lewis. From an almost non-existent industry at the beginning of the 1980s, it grew into the second largest apparel exporter of the world in about three decades. It now employs nearly 4 million workers, mostly female, at very low wages. The rise of RMG industry is a story of the growth of an indigenous entrepreneurial class, commoditisation of female labour and female empowerment.

Other industries such as textiles, RMG accessories, pharmaceuticals, plastics, chemicals, etc. also grew rapidly. The contribution of the manufacturing sector in national output increased from 6.6 per cent in 1972-73 to 20.2 per cent in 2014-15. Manufacturing employment increased from only 1 million in 1974 to 9.5 million in 2013. Obviously, part of this increment was drawn largely from the agricultural households.

Large scale migration to overseas destinations in search of employment also began during the 1970s. By 2016, more than 10 million people (equivalent to one-third of the agricultural labour force) went overseas for work. This greatly helped to reduce the pressure of employment on agriculture. Without the opening up of the external labour market, the agricultural wage might have been further depressed and the economic woes of the rural population could have been worse.

An improvement in economic conditions and in particular the large inflow of remittances into rural areas from those who migrated overseas for work helped the flourishing of the rural informal sector, especially service-oriented activities, as both rural consumption and rural investment demand soared. Employment in rural informal activities increased that helped to reduce labour pressure in agriculture. This also acted as a cushion against a fall in the real wage.

VII. LABOUR PRODUCTIVITY AND REAL WAGE

One question about our agrarian history that has not been adequately analysed is why did the agricultural real wage rate fall so sharply in the wake of the liberation war and why did it take such a long time to recover. In general, the

real wage rate in any industry reflects the marginal productivity of the workers if the labour market is reasonably free, that is, if there is freedom to hire and fire, and freedom to work or not to work subject to the normal constraints faced by the labour market participants. Since the labour market of Bangladesh is not known to have had significant restrictive practices, such as bonded labour or interlinked indebtedness, it could be regarded to have been reasonably free.¹¹ In such a market, there should be a close correspondence between the real wage rate and the productivity of labour.

Let the agricultural production function be written as:

$$Q = f(A, L, N, I, U)$$

where Q =agricultural output, L =land area, N =standardised labour units, I =irrigation water and U =fertilisers and A is a technology parameter. The marginal products of all inputs of production f_i are positive, and diminishing $f_{ii} < 0$, while $f_{ij} > 0$ ($i \neq j$). Optimal labour employment requires that the value marginal product is set equal to the nominal wage W , that is, the marginal product is set equal to the real wage $w = W/p$:

$$p \frac{\partial Q}{\partial N} = W \quad \text{or,} \quad \frac{\partial Q}{\partial N} = w$$

where p is the price of the product. The calculation of marginal product is difficult and susceptible to inaccuracies. In order to render the equation amenable to less difficult estimation we approximate the general production function above with a homogenous Cobb-Douglas production function:

$$Q = AL^\alpha N^\beta I^\gamma U^\rho \quad \text{where } \alpha, \beta, \gamma \text{ and } \rho \text{ are elasticity parameters.}$$

It is then straightforward to show that

$$\frac{\partial Q}{\partial N} = w = \beta \frac{Q}{N}$$

Thus marginal product of labour is proportional to the average product of labour where the factor of proportionality is the elasticity of labour with respect to output. Therefore, we may deduce that over a sufficiently long period of time the trend real wage rate should closely track the trend average real labour productivity rate, i.e. these two should be cointegrated. A visual confirmation of this can be found in the scatter diagram shown in Figure 3 which plots

¹¹ Taslim (1988).

agricultural real wage against agricultural labour productivity, π .¹² The latter is obviously a function of all the variables in the agricultural production function above.

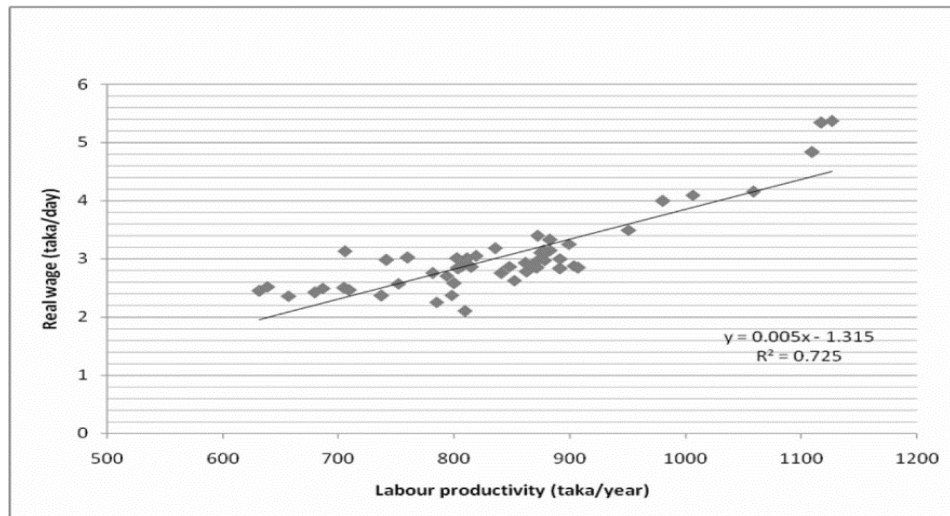
Both real wage and agricultural labour productivity were tested for the order of integration. They were found to be first difference stationary by augmented Dicky-Fuller test. Next a Johansen-Juselius error correction mechanism (ECM) test for cointegration was performed. The cointegrating equation is:

$$\varepsilon_{t-1} = 10.31 + w_{t-1} - 1.70\pi_{t-1}$$

and the short term adjustment equation is:

$$\Delta w_t = 0.01 - 0.30 \varepsilon_{t-1} + 0.16\Delta w_{t-1} + 0.0003\pi_{t-1}$$

Figure 3: Agricultural Labour Productivity and Real Wage



The parameters are statistically significant at 1 per cent level. The relationship above suggests that if labour productivity does not increase, real wage cannot increase sustainably. This is amply borne out by empirical data from the agriculture of Bangladesh. The average labour productivity during the 3-year period 1963-64 to 1965-66 was about the same as that during the period 2002-03

¹²Both real wage and agricultural labour productivity are found to be first difference stationary by Dicky-Fuller test. Johansen-Juselius cointegration test confirms that the two series are cointegrated.

to 2004-05. The real wage of agriculture also did not change much during this long period which lends some support to the hypothesis.

If we accept the hypothesis above, which is well grounded in the neo-classical economic theory of production and amply supported by data, we cannot escape concluding that there was a sharp fall in the productivity of agricultural labour during the first few years after the liberation war and the productivity recovery thereafter was painfully slow. This begets the questions why was there such a fall in productivity?

From the labour market equilibrium condition above, we may derive:

$$d\left(\frac{\partial Q}{\partial N}\right) = dw = \frac{\partial w}{\partial A} dA + \frac{\partial w}{\partial L} dL + \frac{\partial w}{\partial N} dN + \frac{\partial w}{\partial I} dI + \frac{\partial w}{\partial U} dU + \varepsilon$$

where a white noise term ε has been added to capture random effects. The possibility of the real wage rate or the marginal product of labour declining could arise only if any of these terms were negative.¹³ The general properties of a production function suggests all the $\partial w/\partial x_i$ terms above except $\partial w/\partial N$ are positive (i.e. $x_i = A, L, I, U$ only).¹⁴ The latter is negative since the marginal product of an input declines with a greater application of that input. Hence, labour productivity or real wage could decline for any of the following reasons: (1) technological decay, (2) a reduction in the non-labour inputs such as land, fertiliser, etc. and (3) an increase in labour engaged in agriculture. The real wage could also decline due to an exogenous negative shock to productivity of labour (such as climate change) or a reduction in the relative prices of the products of the sector if some index of the general price level is used for estimating the real wage. A reduction in the subsistence requirement could also push the wage down in the presence of surplus labour as explained later.

Since the 1960s the agricultural sector, especially crop agriculture, has undergone a slow process of technological change, which has been dubbed land-augmenting technological progress or Green Revolution. Since virtually all arable land was already under cultivation by the 1960s, there was no prospect of employing more agricultural workers and increasing agricultural output, mainly

¹³A negative exogenous shock ε could reduce the marginal product even when the other terms are non-negative.

¹⁴In terms of the Cobb-Douglas production function: $d(\partial w/\partial L) = \alpha\beta AL^{\alpha-1}N^{\beta-1}I^\gamma U^\rho dL$, which is clearly positive as long as $dL > 0$. The same conclusion will be true for all other inputs except labour. In the case of labour $d(\partial w/\partial N) = \beta(\beta-1)AL^\alpha N^{\beta-2}I^\gamma U^\rho dN < 0$ when N is increasing since $(\beta-1) < 0$.

food crops, through horizontal expansion of cultivation. Instead, efforts were concentrated on using the fixed or a slowly declining amount of land more intensively. This was achieved by gradually switching to new varieties of rice, which came to be known as high-yield varieties (HYVs). The nomenclature derives from the fact that these varieties gave much greater yields per unit of land than the local varieties of rice. These varieties required greater use of labour and other inputs such as chemical fertiliser and irrigation (controlled) water. Irrigation reduced dependence of farming on rainfall that permitted winter cropping on a large scale. The cropping intensity increased such that the gross cropped area increased even though the net availability of cropped land was constant or slowly declining. Another aspect of the new technology was that it did not require large scale mechanisation, and hence did not require large upfront investment in equipment. This made adoption of HYV by even small farmers easier.

We could perhaps measure the rate of progress of this new technology of production by the rate of increase in the adoption of HYV of rice in total cultivation since HYV crops embodied technological advance in agriculture. The evidence we have is that the total area devoted to HYV of rice increased steadily since the 1970s (see Table II). The yield rate of cereals fell in the aftermath of the liberation war from 0.46 ton/acre in 1969-70 to 0.42 ton/acre in 1972-73 and rose back to 0.46 ton/acre in 1974/75. It then increased gradually to 1.21 tons in 2013-14 – almost a three-fold increase.¹⁵ The new technology introduced in the 1960s was sustained without any significant reversals even after the immediate post-war period. Hence, we could exclude the possibility that agricultural labour productivity could have declined due to a regression of technology.

TABLE II
SELECTED INDICATORS OF AGRICULTURAL CHANGE

Year	Net cropped area '000 acres	Gross cropped area '000 acres	HYV rice area '000 acres	Fertiliser per net acre kg	Ratio of Irrigated area to net area (%)
1969-70	21,763	32,841	652	13	12.0
1974-75	20,559	28,637	3,567	14	17.3
1981-82	21,212	32,638	5,745	36	20.1
1991-92	19,716	34,120	12,003	116	40.5
2001-02	19,824	35,076	17,010	166	57.3
2011-12	19,594	37,261	21,868	207	89.0
2012-13	19,543	37,150	21,854	206	90.0

Source: BBS, *Statistical Year Book of Bangladesh*, various issues.

¹⁵ BBS, *Statistical Year Book of Bangladesh*.

With surplus labour it is possible for the real wage to decline even though it was at the subsistence level at the beginning. The real wage is a daily affair: it is the amount an agricultural worker receives for working on a particular day. Regardless of whether a worker is employed for a week a month or a year, the amount he is paid on average per day worked is the real wage.¹⁶ However, subsistence is defined over a longer period regardless of whether the worker is employed or not. As noted earlier, it is determined by the biological needs and cultural and social situation of the worker. It is likely to be stable over the short to medium term.

If an agricultural worker is to be sustained, he must be paid the minimum subsistence requirement. Consider the case of an agriculture which raises only one crop per year, as is the case in many places. If there are no alternative income-earning employment opportunities, the worker must be paid his minimum *yearly* subsistence requirement during the period he actually works as hired labourer. If the employer fails to pay such a wage, he will not have a sustained supply of hired workers in future. Note that with some surplus labour in agriculture and free movement of labour there cannot be alternative employment opportunities since part of the surplus labour would have exhausted these opportunities.

If a technological advance permits double cropping, how would the real wage rate change? The minimum yearly subsistence requirement does not change, but since two crops are grown in a year, the worker now works twice as long.¹⁷ His subsistence real wage (per day) accordingly falls to one-half of the previous wage rate, that is, even if the worker is paid half of what he was paid per day, he would still earn the subsistence requirement over the year. The crucial point here is that the labourers depend entirely on agricultural wage income for subsistence. This is a paradoxical result: land-augmenting technological progress raises productivity of the agricultural worker (over the year) but reduces the real wage of agriculture without breaching the subsistence constraint.

The HYV crop cultivation spread in Bangladesh during the first two decades at almost 11 per cent per year. Thereafter area devoted to HYV crops slowed down to less than 3 per cent per year. All the co-operant inputs, such as fertilisers and irrigation, all increased markedly. The rapid spread of HYV technology

¹⁶ If the worker is paid by the week, fortnight or month, it is adjusted in order to arrive at the daily wage rate.

¹⁷ We abstract from the fact that the subsistence requirement may increase somewhat if the worker is employed than if he is not employed.

helped the increase in cropping intensity from 1.39 in 1972-73 to 1.90 in 2011-12 by making multiple cropping easier and cost-effective. As a result, the gross cropped area increased by 32 per cent between 1971-72 and 2011-12. The use of irrigated water also increased markedly during the first two decades in tandem with the spread of HYV rice crops. The proportion of gross cropped area irrigated doubled during this period from 10.3 per cent to 20.9 per cent. It more than doubled during the next 22 years to 46.8 per cent. The use of chemical fertiliser also increased very rapidly. The growth rate of fertiliser use was very high (more than 40 per cent per annum) mainly because there was little use of fertiliser in the early 1970s. The application of fertiliser per net acre increased from 18.4 kg in 1972-73 to 104.4 kg in 1990-91. During the next two decades it doubled to 210.9 kg per net acre. Such large increases in non-labour inputs, according to the properties of the production function, must have raised the productivity of labour.

However, gross cropped area declined by a whopping 14.2 per cent in the immediate aftermath of the liberation war. It started increasing but dipped again during the famine year 1974-75 when it was 12.8 per cent below the 1969-70 level. This large reduction in gross cropped area must have exerted a substantial downward pressure on labour productivity in the immediate post-liberation years. Since then gross cropped area increased steadily, but did not rise above the 1969-70 level until 1982-83. Thus, it is possible to argue that beyond this year, agricultural labour productivity could not have declined due to a reduction in the land input.

The expansion of HYV rice acreage suggests that the land-augmenting type of technological progress gathered momentum in the 1970s and 1980s and continued thereafter without let. Since the gross cropped area increased markedly, it must have raised the labour demand. It has been widely documented that HYV cultivation made greater use of labour.¹⁸ Hence, the more intensive use of labour in HYV crop production must have significantly raised total labour demand. It is then possible to argue that technological progress must have increased agricultural labour demand significantly. With rising demand for agricultural labour in a reasonably free labour market, the real wage could not possibly have declined or remained stagnant due to the technological change experienced by the agriculture of Bangladesh during this period without compensating variations elsewhere.

Real wage is determined by both demand and supply factors. As it happened the impact of the increase in labour demand on real wage due to the technological

¹⁸ Ahmed (1977).

progress experienced by the country was offset by a rapid increase in population and labour force during this time. Much of the increase in labour force was accommodated in agriculture as manufacturing growth was sluggish. Although the share of agricultural employment in total employment decreased monotonically, actual employment increased. Unfortunately, there is no consistent set of employment data for the entire period published by Bangladesh Bureau of Statistics. The estimates of Islam and Taslim (1996) suggest that agricultural labour force increased from 19.9 million in 1971-72 to 32.6 million in 1990-91 according to the *old* definition of labour force, i.e. 64 per cent increase in labour in two decades.¹⁹

It is very likely that there was an influx of labour into agriculture after the end of the liberation war due to the loss of employment in other sectors because of the devastation and dislocation caused by the war. As Table IV shows, there was a large reduction in manufacturing employment in the wake of the liberation war. Many of these workers might have returned to agriculture. Most of the increase in the labour force due to the increase in population also had to be accommodated in agriculture. The increase in the agricultural labour force together with a reduction in the gross cropped area could have swamped any positive impact of technological progress on the real wage during the early years of the sovereign country.

The impact of the large increase in agricultural labour is evident from the reduction in both net and gross cropped area per agricultural labour. During the period from 1969-70 to 2011-12, the net cropped area declined by 10 per cent, while the gross cropped area increased by only 13 per cent. The agricultural labour force increased during the same period by a massive 71 per cent. As a result, the net cropped area per agricultural labour decreased by a whopping 47 per cent during the same period and the gross cropped area per agricultural labour decreased by 33 per cent. With the availability of per capita agricultural land shrinking steadily the productivity of agricultural labour must have suffered a downward pressure.

The influence of population growth and labour supply on real wage is brought into focus in Table III. It shows that the country's population increased rapidly during the 15-year period 1959-60 to 1974-75. Agricultural labour kept pace with the increase in population, suggesting that most of the increase in

¹⁹According to UNCTAD, the agricultural labour force of Bangladesh increased from 25.2 million in 1980 to 31.8 million in 1991, that is, a 26.3 per cent growth in 11 years. Thereafter the growth rate slowed down and the labour force in agriculture stood at 33.3 million in 2005. See <http://unctadstat.unctad.org/wds/TableViewer/tableView.aspx>

population was accommodated in the agricultural sector, which was still largely traditional. HYV technology had not spread widely and cropping intensity increased modestly such that the demand for agricultural labour could not have increased sufficiently to absorb the entire increase in agricultural labour. The excess supply of labour showed up in a falling real wage. Population growth declined during the next 30-year period 1975-76 to 2004-05, but was still quite high. Much of this labour had to be absorbed in agriculture as the industrial or tertiary sectors did not grow rapidly enough. However, since during this period the country experienced robust dissemination of HYV technology which is, as mentioned earlier, much more labour-intensive than the traditional methods of farming, there was commensurate increase in labour demand that permitted some increase in the real wage despite the substantial increase in the agricultural labour force. The next period, 2005-06 to 2012-13, experienced a lower population growth and the rise of the industrial and service sectors to a dominant economic position. These sectors provided most of the employment for the reduced volume of additional labour that came into the market. Since 2004-05, agricultural labour actually declined in absolute terms (UNCTAD data) even though population and the labour force grew at a considerable pace. Since 2005-06 there was a net migration of labour from agriculture to other sectors (including overseas markets), implying that the latter had to bid away labour from agriculture to feed their needs. Consequently, this period witnessed an unprecedented high rate of growth of agricultural real wage.

TABLE III
GROWTH OF AGRICULTURAL LABOUR, POPULATION AND REAL WAGE
(per cent)

	Total growth of agricultural labour	Average annual growth rate of agricultural labour	Total growth of population	Average annual growth rate of population	Agricultural real wage growth rate
1959-60 to 1974-75	47.33	2.62	48.78	2.68	-1.65
1975-76 to 2004-05	50.42	1.42	62.95	1.83	0.87
2005-06 to 2012-13	-3.32	-0.42	12.12	1.44	7.40

Sources: Bangladesh Bureau of Statistics, UNCTAD and Islam and Taslim (1996).

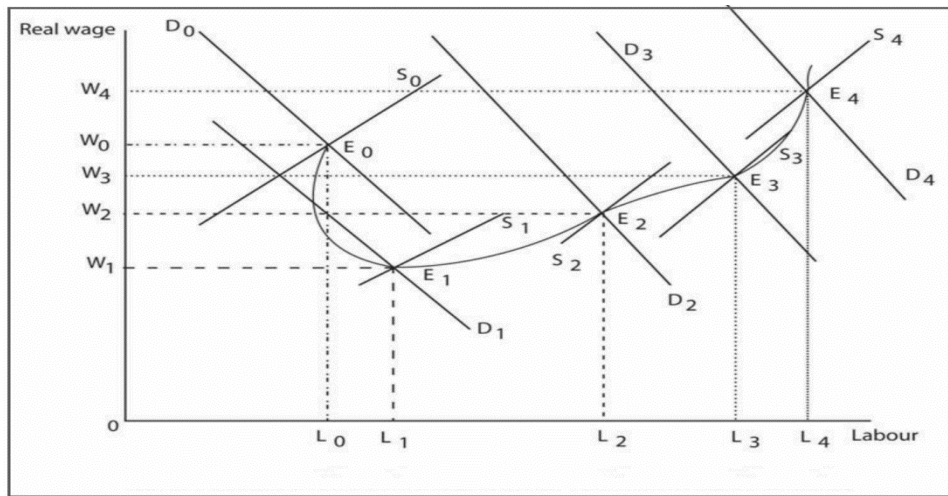
The story told above about the real wage movement can be more easily illustrated with Figure 4. The initial (pre-liberation) labour demand and supply in the agricultural sector are shown by D_0 and S_0 . The equilibrium is established at E_0 with the real wage at w_0 . As explained earlier, in the immediate aftermath of the liberation war, the demand for labour declined, say, to D_1 but supply

increased to S_1 such that the equilibrium shifted to E_1 with a large drop of real wage to w_1 . Since then the demand for labour in agriculture increased with the adoption of HYV crops which continuously shifted the labour demand curve rightward. As the labour supply curve also shifted right, the increase in the real wage was subdued; it increased gradually from w_1 to w_3 . Since then the incremental labour supply dried up such that the increase in labour demand with continued expansion of HYV acreage caused a fairly large increase in the agricultural real wage at the new equilibrium E_4 . It may be mentioned that between E_0 and E_4 the population and the labour force of the country more than doubled and cereal crop production more than trebled.

VIII. RELATIVE PRICES

The real wage relevant for the employers of labour for agricultural cultivation is the one derived by deflating nominal wage by the price of the agricultural product since the optimality condition requires that the value of the marginal product of labour equal the nominal wage rate: $p_a \cdot MPL = w$ or $MPL = w/p_a$, where p_a is the price index of the agricultural good.

Figure 4: **Real Wage with the Expansion of HYV Crops and Rising Labour Supply**



The real wage generated by deflating nominal wage by CPI does not necessarily meet this optimality condition. If the consumer price index (CPI) and p_a move close together, there will not be much difference between the real wage

series generated by these two price indices. However, if the growth of CPI consistently exceeds p_a by a considerable amount, the real wage series generated by deflating nominal wage by CPI will be lower than that generated by the agricultural goods price index. BBS provides data for agricultural goods price index for the period 1978-79 to 2005-06 only. During this period the CPI exceeded the agricultural goods price index, and consequently the real wage derived by using the CPI will be lower than that derived by using the agricultural price index. The difference becomes quite significant from 1994-95 onward. This part of the reduction in the real wage of agricultural labourers could be explained by the choice of the deflator. However, it should be noted that regardless of which deflator is used, the real wage remained below the base year (1969-70) of these indices for at least two decades. By any reckoning this is a rather long period for the real wage to remain depressed in a growing economy.

IX. AGRICULTURAL AND INDUSTRIAL REAL WAGE

According to the Lewis model of economic development with surplus labour, agricultural wage can increase only if the industrial wage increases; that is, the driving force of the economy is the industrial sector. However, the real wage in the industrial sector suffered a greater decline relative to that of the agricultural sector in the wake of the liberation war. Agricultural real wage (with CPI deflator) declined by 34.4 per cent between 1971-72 and 1974-75. During the same period, the industrial real wage declined by 56.2 per cent. It was not until 1983-84 that the relative industrial real wage exceeded that in 1969-70. The large fall in industrial wage must have helped to pull down the agricultural wage, i.e. the Lewis model worked in the opposite direction.

BBS data on industrial productivity show that there was precipitous decline in labour productivity in the major industries soon after the liberation war. The real productivity of industrial workers fell by 52.5 per cent from 1969-70 to 1974-75 (see Table IV). This explains a similar large proportionate decline in the real wage (56.2 per cent) of the industrial workers.²⁰ Part of the decline in the labour productivity is explained by a large increase in employment between 1969-70 and 1974-75 and part by a fall in the real gross value of industrial production.

²⁰ From the labour market optimality condition derived earlier, the rate of change in the wage rate is equal to the rate of change of labour productivity.

TABLE IV
PRODUCTION AND INDUSTRIAL REAL WAGE

Year	Average daily employment	Gross value of industrial production ('000 Tk.)	GDP deflator	Real productivity of labour* (Tk.)	Real wage index of industrial workers (BBS)	Real fixed assets ('000 Tk.)
1969-70	175,791	3,635,516	100	20,681	100	22,237
1970-71	222,059	3,396,398	102	15,027	103	23,270
1971-72	156,370	2,351,497	106	14,187	101	14,503
1972-73	153,793	3,090,898	182	11,067	70	10,215
1973-74	260,444	7,618,997	252	11,614	61	14,509
1974-75	276,989	11,730,892	431	9,823	44	10,194
1975-76	301,891	16,259,384	362	14,881	57	18,270

Note: *Real values are nominal values adjusted for changes in GDP deflator.

Source: *Statistical Year Book*, various years, BBS.

The increase in employment was motivated mainly by political considerations. The fall in production was due to many factors including a loss of technical and skilled manpower, frequent labour problems and a breakdown in industrial management in the aftermath of the war.²¹ Asset stripping in industrial units became rampant during the post-liberation years. Fixed assets of the industrial sector decreased by 54.2 per cent in real terms between 1969-70 and 1974-75. This obviously contributed to the reduction in industrial labour productivity. The wholesale nationalisation of significant industries immediately after liberation had cast a dark shadow over the industrial sector.

The most noticeable aspect of the real wage movement in agriculture is that for about three and half decades it moved up and down without showing any sustained increase such that the real wage in 2003-04 was still about the same as that in 1969-70. The agricultural labourers of Bangladesh suffered very badly in the wake of the liberation war and remained worse off than the pre-liberation period for at least two decades. But since 2004-05, i.e. nearly three and half decades after the emergence of Bangladesh, the real wage experienced a rapid and sustained increase; it increased by 65 per cent by 2012-13 (77 per cent in

²¹A large numbers of the skilled workforce of the time were of non-Bengali origin (*Biharis*). They were either killed or they fled during the war, or interned after the war never to be rehabilitated in the same trade.

terms of real wage adjusted by GDP deflator). Never in the recent history of agriculture of Bangladesh was such a large increase achieved in such a short time. Importantly, the real wage increased *continuously* since 2004-05.²²

This large and sustained increase in the agricultural real wage over the 8 year period, 2004-05 to 2012-13, might be an indication of exhaustion of surplus labour in agriculture. Urban industrial growth, and in particular, overseas migration seem to have drawn off the surplus labour.²³ It would seem that the economy had reached the “turning point” of Lewis at about the middle of the first decade of the new millennium. If so, Bangladesh has apparently moved out of the subsistence economy phase with “unlimited supply of labour” to a competitive economy where any net increase in labour demand is likely to see an increase in the real wage rate in all sectors. This also has the implication that the large gap that existed between agricultural and industrial wage rate will narrow down, and there should be a convergence of the real wage rate in all sectors.²⁴

X. INCOME DISTRIBUTION

An implication of Lewis model that has not received much attention is that during the early phase of development with unlimited supply of labour, income distribution is likely to worsen. Until the turning point is reached, there will be surplus labour in agriculture, and hence, the wage rate will be restricted to the subsistence level. Any increment in output due to investment in the non-agricultural sector will accrue to the entrepreneurial and managerial class who spearhead the development of the manufacturing and the tertiary sectors. Hence, their share of income is likely to rise.²⁵ Beyond the turning point the surplus generated by the growth of the manufacturing sector will have to be shared with

²² It may be noted that real wages in other sectors also increased similarly.

²³ According to BMET, nearly 10 million workers have gone overseas for employment since 1976. There is no estimate of how many of them have returned home permanently. It is believed that there are more than 7 million people working overseas.

²⁴ Recent data indicate that the wages of unskilled workers in many industrial activities are less than the wages of agricultural labourers. See BBS, *Statistical Bulletin-Bangladesh 2015*, April.

²⁵ With a constant wage rate, the share of entrepreneurial and managerial income in total income or the surplus over and above the wage payment will rise so long as the rate of increase of output is greater than the rate of increase of employment. This was certainly true of the agriculture of Bangladesh.

the labourers through an increase in the wage rate. If and to what extent the income distribution will improve in favour of the labourers will depend on the increase in the wage rate, which in turn will depend on the labour market conditions.

Referring to the figure above if the shift of the MP line from MP_1 to MP_2 is parallel and is such that $WA=AC$, then $WB=BD$. It can be shown that the new surplus WCD is four times the old surplus WAB . However, total wage payments go up by only two times. Hence, the share of the capitalists increases with capital accumulation.²⁶

Note that the entire surplus accrues to the capitalist class at D , the turning point, or at any point to the left of D . But at any point to the right of D , such as E , they have to cede $WW'EF$ more in wage payments to the labourers than that at the previous wage rate because of the increase in the wage rate from W to W' . If $WW'EF$ is sufficiently large income distribution will improve.

A widely used quantitative measure of expenditure or income distribution is the Gini coefficient. The values of the Gini coefficient for Bangladesh are shown in Table V. The expenditure Gini coefficient increased monotonously from 1984 to 2000. It declined only marginally in 2005, but the decline was significant in 2010. The data suggest that income distribution worsened in Bangladesh until about the middle of the first decade of the new millennium, but since then it has been improving. A similar picture emerges from the data on income Gini coefficient. The income distribution worsened quite significantly since 1983-84. There was a reversal after 2005; the Gini coefficient fell in 2010 indicating some improvement in income distribution. The trends of both expenditure and income Gini coefficients are consistent with the implication of the Lewis model, as indicated above. The poorer sections of the population of the country may be finally getting a better deal.

²⁶In the linear model above if employment increases by k times, industrial surplus increases by k^2 times.

TABLE V
GINI COEFFICIENT FOR BANGLADESH

Year	<i>(per cent)</i>	
	Expenditure	Income
1984	25.9	35.0
1992	27.6	38.8
1996	33.0	43.2
2000	33.5	45.1
2005	33.2	46.7
2010	32.1	45.8

Sources: World Bank website: <http://data.worldbank.org/indicator/SI.POV.GINI?page=2>;
Bangladesh Planning Commission (2013); A. R. Khan and M. Hossain (1989).

XI. CONCLUSION

This paper argues that the trend of the real wage of agricultural labourers in Bangladesh over the last half century was influenced by two opposing forces: the spread of HYV technology and labour supply. The new technology not only raised the annual productivity of the farm land through high yield crops and multiple cropping, but it also raised the annual productivity of labour. However, a rapid growth of agricultural labour supply worked in the opposite direction in the case of labour productivity even though it raised farm productivity. This resulted in the stagnation of the real wage for nearly four decades. Only when the addition to agricultural labour supply became persistently negative around the middle of the first decade of the new millennium, did the real wage show a rising trend. The challenge is to maintain this trend through a rapid development of the non-agricultural sectors such that surplus labour does not reappear to push wages down again.

REFERENCES

- Ahmed, I. 1977. "Technical Change and Labour Utilisation in Rice Cultivation." *Bangladesh Development Studies*, 5(3): 359-366.
- Ahmed, R. 1981. *Agricultural Price Policies under Complex Socio-economic and Natural Constraints: The Case of Bangladesh*. International Food Policy Research Institute, Research Report No. 27.
- Bangladesh Planning Commission. 2013. *Millennium Development Goals: Bangladesh Progress Report 2012*.
- Bose, S. R. 1968. "Trend of Real Income of the Rural Poor in East Pakistan, 1949-66." *Pakistan Development Review*, 8 (3): 452-488, Symposium on Planning Experience in Pakistan (Autumn).
- Boyce, J. K. 1989. "Population Growth and Real Wages of Agricultural Labourers in Bangladesh." *Journal of Development Studies*, 25(3): 467-89.
- Boyce, J. K. & M. Ravallion. 1991. "A Dynamic Econometric Model of Agricultural Wage Determination in Bangladesh." *Oxford Bulletin of Economics and Statistics*, 53: 361-76.
- Herd, R. W. and E. A. Baker, 1972. "Agricultural Wages, Production and the High-Yielding Varieties." *Economic and Political Weekly*, 7(13): A23-A30.
- Islam, T. and M. A. Taslim. 1996. "Demographic Pressure, Technological Innovation and Welfare: The Case of Bangladesh Agriculture." *Journal of Development Studies*, 32 (5): 734-770.
- Khan, A. R. 1984. "Real Wages of Agricultural Workers in Bangladesh." *Economic and Political Weekly*, 19 (4): PE40-PE48.
- Khan, A. R. and M. Hossain. 1989. *The Strategy of Development in Bangladesh*. London: Macmillan.
- Lewis, A. 1954. "Economic Development with Unlimited Supplies of Labour." *The Manchester School*, 22: 139-91.
- Palmer-Jones, R. W. 1993. "Agricultural Wages in Bangladesh: What the Figures Really Show?" *Journal of Development Studies*, 25 (3).
- Clay, E. W. J. 1976. "Institutional Change and Agricultural Wages in Bangladesh." *The Bangladesh Development Studies*, 4(4): 423-440.
- Rahman, R. I. 2009. "An Analysis of Real Wage in Bangladesh and Its Implications for Underemployment and Poverty." Paper prepared for Festschrift Conference In Honor of Professor Azizur Khan, Political Economy Research Institute (PERI), University of Massachusetts-Amherst.

- Ravallion, M. 1990. "Rural Welfare Effects of Food Price Changes under Induced Wage Responses: Theory and Evidence for Bangladesh." *Oxford Economic Papers*, New Series, 42(3): 574-585.
- Taslim, M. A. 1988. "Tenancy and Interlocking Markets: Issues and Some Evidence." *World Development*, 16 (6): 655-666.
- 2014. "A Quiet Transition." *The Financial Express*, October 3.
- X. Zhang, S. Rashid, K. Ahmad and A. Ahmed. 2014. "Escalation of Real Wages in Bangladesh: Is it the Beginning of Structural Transformation?" *World Development*, 64: 273–285.

Appendix

All data series except labour force and population were adopted from various issues of two regular publications of Bangladesh Bureau of Statistics, viz. *Statistical Year Book of Bangladesh* and *Monthly Statistical Bulletin*. The labour force series was constructed from UNCTAD and ILO databases and the population series was built from *Monthly Economic Trends* of Bangladesh Bank. Throughout the paper agricultural labour force and agricultural employment have been used interchangeably since no data on the later exist. Since the likelihood of overt unemployment in agriculture is unlikely the agricultural labour force may be regarded as a good proxy of agricultural employment.

The major problem faced in constructing some of the other series is the several discreet changes in the data due to changes in the definitions of variables or methods of estimation and the changes in base year which made the numbers of different years not always directly comparable. The problem was severe for CPI, GDP deflator and agricultural value added. In order to construct a consistent series for each of these variables, we used the growth rates rather than the actual numbers whenever there was such a change to relate the data of the years following the change to the previous years. The real indices reported in the appendix table were estimated by dividing the nominal numbers by the CPI.

Appendix Table

Year	CPI 1969-70=100	GDP deflator 1969-70=100	Agr value added nominal crore taka	Agr wage nominal (Tk/day)	Agr real VA CPI adj crore tk	Agr real VA per worker CPI adj (Taka)	Real wage CPI adj (Tk/day)	Agricultural labourer ('000)	Agr nominal wage index	Agr real wage index CPI adj	Agr Real wage index BBS	Net cropped area ('000 acre)	Gross cropped area ('000 acre)	HYV rice area ('000 acre)	Fertiliser use (kg/acre)	Total irrigated area ('000 acre)	Population (crore)
1959-60	67	69	826	1.85	1229.12	840.71	2.75	14,620	65.9	98.03		20,575	26,477		0.55		5.31
1960-61	67	74	862	1.95	1292.59	861.73	2.92	15,000	73.6	110.42		20,861	27,593		3.16		5.45
1961-62	70	73	944	2.18	1358.60	882.78	3.14	15,390	76.0	109.37		20,942	27,395		3.20		5.6
1962-63	71	76	933	2.25	1319.59	835.18	3.18	15,800	81.4	115.16		20,899	27,695		3.50		5.74
1963-64	72	70	1,036	2.41	1430.78	882.65	3.33	16,210	89.5	123.66		21,082	28,177		5.30		5.89
1964-65	78	76	1,133	2.65	1450.31	871.58	3.39	16,640	79.1	101.22		21,103	28,537		4.81		6.05
1965-66	82	81	1,222	2.34	1487.05	871.15	2.85	17,070	81.1	98.64		21,601	29,541		5.00		6.19
1966-67	91	93	1,364	2.40	1492.23	851.73	2.63	17,520	87.8	96.10		21,113	29,039		7.75		6.34
1967-68	91	91	1,490	2.60	1630.41	906.79	2.84	17,980	91.9	100.54		21,750	31,440		9.73		6.5
1968-69	96	93	1,541	2.75	1605.39	870.13	2.86	18,450	105.7	110.15		21,624	31,135		10.42		6.65
1969-70	100	100	1,650	2.96	1649.53	871.39	2.96	18,930	100.0	100.00	100	21,763	32,841	652	12.73	2,614	6.81
1970-71	104	102	1,638	3.13	1575.34	810.78	3.01	19,430	105.0	100.96		21,361	30,374	1,137	14.25	2,884	6.98
1971-72	108	105	1,519	3.38	1406.06	705.15	3.13	19,940	99.7	92.31		20,371	28,169	1,542	12.26	2,587	7.10
1972-73	193	182	2,494	4.72	1291.99	631.47	2.45	20,460	129.0	66.84		20,840	29,039	2,631	18.43	2,993	7.43
1973-74	268	252	3,965	6.69	1479.45	704.84	2.50	20,990	186.0	69.40		20,977	29,424	3,826	18.11	3,202	7.64
1974-75	431	431	7,511	9.05	1742.69	809.05	2.10	21,540	261.0	60.56		20,559	28,637	3,567	13.68	3,561	7.90
1975-76	365	362	5,478	8.82	1500.84	678.80	2.42	22,110	279.0	76.44		20,968	29,686	3,835	21.37	3,457	8.08
1976-77	354	371	5,128	8.93	1448.48	638.66	2.52	22,680	268.0	75.71		20,445	28,979	3,162	24.71	3,003	8.27
1977-78	419	433	7,652	9.44	1826.21	784.46	2.25	23,280	312.0	74.46	74	20,693	29,702	2,975	34.62	3,589	8.47
1978-79	458	496	8,728	10.88	1905.59	797.65	2.38	23,890	370.0	80.79	81	20,801	31,846	3,392	33.42	3,662	8.66
1979-80	526	554	9,506	12.46	1807.27	737.06	2.37	24,520	443.0	84.22	84	20,873	31,973	4,936	37.57	3,873	8.87
1980-81	568	632	10,409	13.97	1832.60	709.26	2.46	25,838	482.0	84.86	85	21,158	32,521	5,421	38.91	4,050	9.06
1981-82	656	699	11,398	15.48	1737.48	656.67	2.36	26,459	567.0	86.43	86	21,212	32,638	5,745	36.37	4,264	9.26
1982-83	684	757	12,711	17.05	1858.26	686.52	2.49	27,068	558.0	81.58	82	21,369	33,130	6,498	40.79	4,566	9.47
1983-84	761	867	15,840	19.58	2081.52	752.02	2.57	27,679	572.0	75.16	75	21,442	33,013	6,499	48.18	4,744	9.67
1984-85	856	964	19,456	24.45	2272.88	803.11	2.86	28,301	642.0	75.00	75	21,353	32,496	6,860	59.01	5,121	9.81

(Contd. Appendix Table.)

Year	CPI 1969-70=100	GDP deflator 1969-70=100	Agr value added nominal crore taka	Agr wage nominal (Tk/day)	Agr real VA CPI adj crore tk	Agr real VA per worker CPI adj (Taka)	Real wage CPI adj (Tk/day)	Agricultural labourer ('000)	Agr nominal wage index	Agr real wage index CPI adj	Agr Real wage index BBS	Net cropped area ('000 acre)	Gross cropped area ('000 acre)	HYV rice area ('000 acre)	Fertiliser use (kg/acre)	Total irrigated area ('000 acre)	Population (crore)
1985-86	941	1058	23,896	29.54	2539.48	877.47	3.14	28,941	767.0	81.51	83	21,661	33,459	7,096	53.37	5,183	9.94
1986-87	1061	1175	25,186	31.91	2373.83	802.24	3.01	29,590	941.0	88.69	89	21,878	34,883	7,738	60.38	5,434	10.15
1987-88	1130	1265	26,684	31.15	2361.38	781.06	2.76	30,233	1049.0	92.83	93	20,478	34,148	8,239	73.98	5,800	10.34
1988-89	1208	1363	29,554	32.70	2446.53	793.14	2.71	30,846	1115.0	92.30	92	20,148	33,887	9,645	84.82	6,764	10.55
1989-90	1301	1429	32,686	33.60	2512.40	799.72	2.58	31,416	1245.0	95.70	95	20,633	34,750	10,549	99.02	7,255	10.75
1990-91	1386	1563	36,110	42.20	2605.32	818.67	3.04	31,824	1321.0	95.31	95	20,198	34,680	11,358	104.37	7,479	10.96
1991-92	1449	1630	37,589	41.50	2593.72	814.74	2.86	31,835	1425.0	98.33	98	19,716	34,120	12,003	116.00	7,980	11.33
1992-93	1489	1631	35,102	44.40	2357.51	741.31	2.98	31,802	1523.0	102.29	105	19,418	33,856	12,488	119.27	8,037	11.55
1993-94	1538	1701	37,082	46.40	2411.47	759.47	3.02	31,752	1593.0	103.59	106	19,090	33,333	12,347	116.19	8,126	11.77
1994-95	1674	1850	42,791	48.10	2556.11	806.37	2.87	31,699	1653.0	98.74	103	19,133	33,410	12,283	138.03	8,472	11.99
1995-96	1785	1953	45,395	50.60	2542.48	803.36	2.83	31,648	1738.0	97.34	104	19,281	33,391	12,835	156.79	8,778	12.21
1996-97	1831	1988	49,493	52.50	2703.78	847.58	2.87	31,900	1804.0	98.55	109	19,401	34,089	13,577	156.54	9,124	12.43
1997-98	1958	2077	54,280	54.50	2771.62	862.49	2.78	32,135	1870.0	95.49	107	19,690	34,810	14,104	138.75	9,498	12.65
1998-99	2133	2223	61,440	60.50	2880.63	891.12	2.84	32,326	1950.0	91.43	102	19,741	34,493	15,285	143.10	9,846	12.81
1999-00	2206	2285	64,642	63.50	2930.69	907.27	2.88	32302	2037.0	92.35	103	20,101	35,267	16,370	159.84	10,345	12.98
2000-01	2240	2330	65,385	67.17	2918.32	966.58	3.00	30192	2141.0	95.56	107	19,970	35,335	16,860	149.77	10,920	12.99
2001-02	2293	2395	66,341	70.58	2892.77	957.60	3.08	30209	2262.0	98.63	112	19,824	35,076	17,010	165.71	11,358	13.16
2002-03	2411	2500	69,837	74.83	2896.38	974.59	3.10	29719	2443.0	101.32	118	19,845	35,126	17,474	168.25	11,676	13.34
2003-04	2552	2646	74,428	75.83	2916.73	1014.74	2.97	28744	2582.0	101.18	121	19,843	35,129	17,725	169.53	12,194	13.52
2004-05	2717	2787	79,324	84.42	2919.43	1020.20	3.11	28616	2719.0	100.07	123	19,703	34,845	17,873	190.58	12,441	13.7
2005-06	2912	2927	86,985	94.82	2987.47	1032.85	3.26	28924	2926.0	100.49	124	19,289	33,944	18,785	190.94	13,842	13.88
2006-07	3121	3128	97,900	109.10	3136.51	1067.37	3.50	29386	3156.0	101.11	125	19,266	33,922	19,598	184.31	14,569	14.06
2007-08	3432	3408	110,621	137.00	3223.64	1123.84	3.99	28684	3524.0	102.69	140	19,187	34,280	20,262	202.53	15,145	14.24
2008-09	3660	3629	120,600	149.83	3294.99	1134.55	4.09	29042	4273.0	116.75	169	19,621	35,614	21,813	146.02	15,706	14.42
2009-10	3928	3849	135,591	163.08	3452.21	1181.66	4.15	29215	4832.5	123.04	196	19,484	35,730	22,288	170.04	16,186	14.61
2010-11	4273	4150	153,951	206.75	3602.64	1233.91	4.84	29197	5325.6	124.63	196	19,368	36,926	21,585	210.91	16,904	14.97
2011-12	4727	4511	170,706	252.42	3611.21	1242.03	5.34	29075	6133.6	129.75	196	19,594	37,261	21,868	206.64	17,435	15.27
2012-13	5129	4791	185,753	275.33	3621.68	1240.02	5.37	29207	7448.5	145.23	196	19,543	37,150	21,854	205.80	17,606	15.47

Sources: Bangladesh Bureau of Statistics, Bangladesh Bank, ILO and UNCTAD.