

An Assessment and Determinants of Real Wage: A Macroeconomic Overview of Bangladesh

Md. Arfanuzzaman
Independent Researcher

Abstract

Real wage is an imperative factor to derive the purchasing power of the people as well as to measure the welfare level. It deserves to critically analyze the real wage of the people for adopting necessary policy in order to optimize social welfare. Escalating Real wage appeared as a key driving force to reduce the poverty level in Bangladesh in past decade). The chief objective of this of this study is to examine the implication of real wage in the present context of Bangladesh and justify the present state real wage of from the aspect of national well being. It is appeared in the study that there is a significant difference in the mean real wage between agriculture, general and manufacturing sector of Bangladesh. No significant difference is found between the mean real wage of agriculture and construction sector. it is flickered in wage determination model that co-efficient of education and training variables are dominant and keeping effective role in wage determination both in rural and urban areas of Bangladesh. It deserves special mention that minimal increase in the real wage of agriculture compared to other sector unable to increase the rice equivalent wage for agricultural labor. Which exposed the welfare drop in agriculture sector, revealed in the study.

1. Introduction

The amount of goods and services that can be obtained by the wage level is definated as real wage or real income. Alternatively, how much commodity a citizen of a country can afford by their wage height is known real wage. Ifreal income of the people increases purchasing power of the people is also expected to be increased and demand for local goods and services will boost up. Hence, this increased

aggregate demand will stimulate the GDP growth. When everything remains constant, rise in consumer price leads to decline the real income of the people. Alternatively, fall in consumer price directs to appreciate the real income. Wealth of a nation is unswervingly depends on real income of the people. So, it deserves to critically analyze the real wage of the people for adopting necessary policy in order to optimize social welfare. Escalating Real wage functions as an

imperative driving force to reduce the poverty level in Bangladesh in past decade (IFPRI, 2013). From 2000 to 2010 poverty incidence dropped by 1.7 percent per year (WB, 2011). This means per year 1.6 million poor people has wipe out from the curse of poverty. Rising real wage is a striving force to achieve this momentous success.

2. Background of the Study

Nevertheless to say real wage is one of the prominent determinant to measure living standard, severity of poverty, and inequality in the society as a whole. If real wage doesn't increase along with the GDP growth, people will not enjoy the actual benefit of economic growth. Thus, the real wage of a country needs to be critically analyzed to ensure the proper well being of the nation. In developed word wage is automatically adjusted with the inflation rate but in case developing countries like Bangladesh wage is not automatically adjusted with inflation rate. So, the implication and significance of real wage is higher in the context of developing countries compared to the developed economies. The utmost endeavor has given in this study to assess the real wage of Bangladesh of different sectors and address the welfare concern with the change in real wage in overall economy.

3. Objectives of the Study

The broad objective of this paper is to analyze the real of agriculture, manufacturing, general

and construction sectors. The specific objectives are under mentioned.

- i) Examine the implication of real wage in the present context of Bangladesh
- ii) Justify the present state real wage of from the aspect of national well being

4. Review of Literature

Kumer (2009) analyzed the real wages, inflation and labor productivity interrelationships using co0integration, Granger-causality, and structural change tests. He pointed out higher real wages increase the opportunity cost of job loss, which can stimulate greater work effort to avoid redundancy. Second, an increase in real wages will result in an increase in the unit cost of labor and cause firms to substitute capital for labor, which will be reflected in an increase in the marginal productivity of labor. This study exposed 1 percent increase in manufacturing sector real wages led to an increase in manufacturing sector productivity of between 0.5 and 0.8 percent in Australia. Besides, Granger causality test results suggest that real wages and inflation both Granger-cause productivity in the long run.

Robert (1986) conducted a study on Real wages, employment and inflation. Here he illustrates population growth is exogenous and the supply of labor from any fixed population is an inelastic function of the real wage rate, but It is assumed that labor supply is infinitely elastic at some rigid real wage. The purpose of

that study is to construct a model which reconciles these apparently divergent views of labor supply. Rationalization in supply and demand terms of the observed co-relation between unemployment, inflation and real wage rate was secondary purpose of the study. The findings of the study were labor supply react on anticipated normal and permanent real wage rate and labor leisure choice has a negligible effect on labor supply. Furthermore, the deviation of real was seems to keep strong effect on labor supply.

Huang (2002) inspect the evolution of the cyclical behavior of U.S. real wage rates from the interwar period to the post World War II period using a dynamic general equilibrium model that emphasizes demand-driven business cycle fluctuations. Here, he found changes in the cyclical behavior of real wages arise endogenously from the interactions between nominal wage and price rigidities and an evolving input-output structure.

Growth in real wage largely influence to rise working class and living standards during the industrial revolution in great Britain (Allen 2007). There is accelerationist relationship between the change in price inflation and the unemployment rate is consistent with any type of microeconomic real wage dynamics (Whelan 1999). From 1800 BCE to 1300 CE yields real incomes of unskilled laborers tended to be very low and similar result was fond in eighteen and nineteen centuries (Scheidel 2009). Here he relates observed variation in real incomes to

variation in overall economic performance and social development. Allen (2001) relates the aggregate cost of obtaining the required goods to the mandated maximum income of an unskilled laborer in order to ascertain the proportion of a particular consumption basket that worker would have been able to afford.

5. Methodology and Data Sources

In order to attain the research objectives different statistical and econometric methods are applied. The followings techniques have been used for the purpose of analysis:

5.1 Differences in Mean Test

In order to examine the wage differential between agriculture, industry, construction and general wage t-test has been used in both case of real and nominal wage. By this difference in mean test it can be stated confidently that whether there is a significant difference in mean wage among the sectors. Here is the formula of T-test.

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\rho \sqrt{1/n_1 + 1/n_2}}$$

Here,

$$\rho = \sqrt{\frac{n_1 S_1^2 + n_2 S_2^2}{n_1 + n_2 - 2}}$$

5.2 F-test

The F-test has been used to examine whether there is a significant difference among the growth of agricultural, manufacturing, general and construction wage level. Here If the null hypothesis is rejected on the basis on F-test value, it can be stated that there is a difference in growth of different sectors and vice versa.

$$F = \frac{RSS_r - RSS_{ur} / df}{RSS_{ur} / df}$$

Here,

$$RSS_r = \ln Y = \alpha + \beta_1 T + U_i$$

In this equation, $\ln Y$ is the log of pooled data of agriculture and manufacturing wage.

T represent the time series of agriculture and manufacturing wage and U_i is the error term.

Besides, $RSS_{ur} = RSS_1 + RSS_2$

where,

RSS_1 is the residual some of square of first separate regression and

RSS_2 is the residual some of square of second separate regression.

Besides, RSS_{ur} is the unrestricted model of two separate regression and RSS_r is the restricted model of single regression.

5.3 Wage Determination Model

In order to construct the wage determination model in agriculture following model has been used. (Gujarati, 2010)

$$\ln Wage = \beta_0 + \beta_1 Age_i + \beta_2 Primary_i + \beta_3 Secondary_i + \beta_4 SSC\&above_i + \beta_5 Rge_i + \beta_6 lei_i + \beta_7 Landd_i + \beta_8 Hoi + \beta_9 Tni + \beta_{10} Ctgi + \beta_{11} Khli + \beta_{12} Rjsi + \beta_{13} Brii + \beta_{14} Syli + \beta_{15} Gender_i + U_i$$

To determine what factors determine daily wage in rural and urban areas above model has been estimated in section 6.3.

Where,

$\ln Wage$ = Log of Daily Rice Equivalent Wage

Age = age of workers

Primary = 1 if primary, 0 otherwise, 0 otherwise

Secondary = 1 if secondary, 0 otherwise

SSC&above = 1 if SSC&above, 0 otherwise

Rge = regular salaried employee ,1 if regular paid, 0 otherwise

le = informal employee , 1 if informal worker, 0 otherwise

Landd = land owned in decimal , 1 if land owned, 0 otherwise

Ho = home owner, 1 if home owned, 0 otherwise

Tn= training, 1 if received any training, 0 otherwise

Ctg = Chittagong, 1 if from Ctg, 0 otherwise

Khl = Khulna, 1 if from khl, 0 otherwise

Bri = Barishal, 1 if from Bri, 0 otherwise

Syl = Sylhet, 1 if from Syl, 0 otherwise

Gender = 1 if female, 0 otherwise and

U_i = error term

5.4 Log linear Model

A log linear model is exercised to find out the growth rate of real wage for different sectors. For the estimation of constant growth rate of agricultural, general, construction and manufacturing sectors real wage, following semi log model has been estimated.

$$\text{Log } Y = \beta_0 + \beta_1 T + U_i$$

Where, Y is the dependent variable, β_0 denotes intercept, β_1 indicates regression co-efficient, T represents the time, and U_i considered as the error term.

6. Results and Discussion

Real wage represents the significance of purchasing power capacity. So, increase in real wage is also important along with increase in

nominal wage. Otherwise workers will not receive the actual benefit of wage rise. It is noticeable that after FY 2007-08 the growth rate of real wage appreciably increased for all sectors compared to preceding fiscal years. Besides, likewise nominal wage, there is a differential in the growth rate of real wage in each sector. Initially in 2001-02 the real wage of manufacturing workers was higher than other sectors even more than general wage. Whereas, real wage of agricultural sector was least compared to that of others. This situation remains unchanged over the years and the real wage gap between manufacturing, agricultural, general and construction sectors increased significantly.

Here it can be noted that the growth of agricultural and construction sector is nearly same after FY 2004-05. In 2010, real wage of construction sector catch up the general wage level and manufacturing sector is able to keep its position in top in terms of receiving real wage while agricultural sector is still back than that of others.

Fiscal Year	General Wage	Manufacturing Wage	Construction Wage	Agricultural Wage
1999-2000	121	137	116	103
2001-02	125	142	118	107
2002-03	130	150	121	112
2003-04	141	169	127	118
2004-05	146	177	125	121
2005-06	149	181	124	123
2006-07	149	183	123	124
2007-08	150	184	124	125
2008-09	154	206	141	140
2009-10	174	243	171	169

In order to examine the mean difference between the real wage of agriculture and other sectors several t-test has been run. First of all the agricultural and manufacturing real wage is taken into account to check the mean difference between them. Here the null hypothesis is rejected based on the test result which indicates there is a significant mean difference between the real wage of agricultural and manufacturing sector. Secondly, null hypothesis is also rejected in

case of agricultural and general real wage. Here it can be stated that there is a significant difference appeared between the real wages of these two sectors. Finally, agricultural and construction sectors real wage is also considered for the t-test. Here the alternative hypothesis is valid and the null hypothesis cannot be rejected, which signifies there is no any mean difference between the real wage of agriculture and construction sectors.

Table 4: Results of Differences in Mean Test for Real Wage

	Agricultural vs. manufacturing wage	Agricultural vs. General wage	Agricultural vs. Construction wage
T-test value	-4.72	-2.71	-0.363
P(T ≤ t)	0.0001	0.007	0.360
H₀ (Null Hypothesis)	There is no significant mean difference between agricultural and manufacturing real wage	There is no significant mean difference between agricultural and general real wage	There is no significant mean difference between agricultural & construction real wage
H₁ (Alternative Hypothesis)	There is a significant mean difference between agricultural and manufacturing real wage	There is a significant mean difference between agricultural and general real wage	There is a significant mean difference between agricultural and construction real wage

It is precious to derive the growth of real wage in agriculture, construction, general and manufacturing sectors. From the derivation of growth rate of different sectors real wage, it can be stated that how much differential exist in the growth rate of real wage in agriculture, manufacturing, general and construction sectors.

The estimated log linear model helps to scan the constant growth rate of agriculture, construction, general and manufacturing sectors. Here from the regression co-efficient it can be stated that the growth rate of general, agriculture, construction and manufacturing

sectors are correspondingly 3.3%, 4.5%, 3.1% and 5.5% and statistically significant at 1%. It seems growth of manufacturing sectors real wage is pioneer than that of others. Besides, growth of agricultural real wage ranked second among the other sectors. Growth of general and construction sectors real wage is found almost equivalent in the simulation result. It can be encapsulated that although the wage of agriculture is far lower than other sectors, growth of real wage in agriculture is some optimistic compared to that of general and construction sectors.

Table 5: Results of Log Linear Model

	R ²	T-Statistic	Coefficient	Standard Error
General Wage	0.88	7.13***	.033	.004
Agriculture Wage	0.80	5.32***	.045	.008
Construction Wage	0.56	2.96***	.031	.010
Manufacturing Wage	0.89	7.83***	.055	.007

Note: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In order to inspect whether there is a significant distinction between the real wages growth of different sectors f-test has been simulated. Here, null hypothesis is assumed as a growth of real wage is same between two sectors and vice versa for alternative hypothesis. For all the three section null hypothesis is rolled out and alternative

hypothesis remains valid. This signifies that there is a significant difference among the growth of real wage in agricultural, general, construction and manufacturing sectors. It can also be stated that there is a notable growth exists in the real wage of different sectors but the rate of growth is not similar between agriculture and other sectors.

Table 6: Estimates of F-test

	Rss _{ur}	Rss _r	F	H ₀	H ₁
Agriculture & Manufacturing wage	0.0493	0.078	17.8	Growth of real wage is same	Growth of real wage is different
Agriculture & construction wage	0.0755	0.209	36.44	Growth of real wage is same	Growth of real wage is different
Agriculture & General wage	0.0375	0.108	38.82	Growth of real wage is same	Growth of real wage is different

6.3 Determinants of Wage

It is very significant to derive the determinants of real wage in Bangladesh. Here the endeavor has been given on different factors i.e. human

capital endowment of labor force, resource they hold, gender, and age for the analysis that may dominate the wage variation. In the absence of reliable time series data, an

understanding of the factors affecting wage can be obtained through a cross sectional analysis of determinants of wage. In addition, Cross sectional regression can also allow us to

isolate the wage differential among the regions and examine how far the wage diverges due to pure location factors.

Table 7: Determinants of Wage in Bangladesh: Results of OLS Regression

Dependent Variable: Log of Daily Rice Equivalent Wage, 2000

Explanatory Variables	Rural		Urban	
	β	t	β	T
Constant	1.28	29.85	3.51	64.83
Workers age	0.02	7.92***	0.05	15.22***
Primary dummy	0.10	7.08***	0.14	6.77***
Secondary dummy	0.12	7.81***	0.17	8.45***
SSC + dummy	0.46	22.18***	0.64	34.63***
Regular salaried employee dummy	0.08	3.48**	-0.09	-5.21**
Informal employment dummy	0.07	4.46**	0.14	09.87***
Land owned in decimal	0.00	4.88**	0.00	6.61**
Home owner dummy	0.07	3.76**	0.06	2.36*
Whether received any training	0.13	5.23**	0.07	4.90**
Chittagong dummy	0.19	11.25***	0.12	.52*
Khulna dummy	0.04	2.83**	-0.06	-10.77***
Rajshahi dummy	-0.03	-3.42**	-0.19	-17.39***
Barisal dummy	0.28	13.19***	0.09	-3.48*
Sylhet dummy	0.17	5.93***	0.18	6.12***
Dummy for female	-0.29	-19.12***	-0.31	-16.79***
Value of F	252.3		507.12	
Adjusted R ²	0.47		0.58	

Source: Authors Calculation Based On the LFS 2010.

It is appeared in the regression estimates; human capital works as a leading force for wage determination both in rural and urban areas. In urban area education plays comparatively dominant role than that of rural area for wage determination. Here the regression co-efficient is found to have 0.10, 0.12, and 0.46 respectively for primary, secondary and SSC+ level which are positive and statistically significant. It seems in the estimates that, the wage rate becomes progressive as level of education increases. Labor with SSC+ education gets nearly three times higher wage than the labor with primary and secondary education in rural area. Besides, regression co-efficient for primary, secondary and SSC+ level appear 0.14, 0.17, and 0.64 correspondingly for urban area. It comes into the view, after secondary education wage is highly impacted by education in urban area which is more than three times higher than secondary education. Location can also be determinants of wage. Here except Rajshahi and Khulna all location has a positive impact on

wage variation in urban area. In rural area expect Rajshahi all region has positive co-efficient which indicates positive role on wage determination by the geographic factors.

It is revealed in the estimation that training is dominating in rural area than urban area and which also signifies training has more demand on employer side and offer better wage in rural area than that of urban area.

6.4 Implication of Rice Equivalent of Daily Wage

In order to examine the welfare level of working people in agriculture sector daily nominal wages are taken into account to derive rice equivalent wage. Rice equivalent wage also express the real wage. Because, it can flicker how much rice a labor can purchase by his daily wage rate. When the Rice equivalent wage is compared with preceding years it can be realized whether the welfare level is changed and in which direction.

Table: Rice Equivalent of Daily Nominal and Real Wage in Agriculture

Year	Nominal wage (Tk/day)	Rice price (Tk/kg)	Rice equivalent of wage (kg/day)	% Change in Rice equivalent of wage
2000	63.50	13.94	4.56	2000 to 2003: 15.6
2001	67.17	13.34	5.03	
2002	70.58	13.25	5.33	
2003	74.83	14.21	5.27	
2004	75.83	14.49	5.23	2003 to 2006: - 2.08
2005	84.42	17.42	4.85	
2006	94.82	18.38	5.16	
2007	109.10	23.54	4.63	2006 to 2010: -6.7
2008	118.46	32.74	3.6	
2009	142.43	36.25	3.92	
2010	161.06	33.48	4.81	

Source: Authors Calculation based on SYB 2010

It is demonstrated in the table that initially in 2000 the daily nominal wage of agriculture was 63.5 taka which is gradually amplified and reached to 161.06 taka. The growth of daily nominal wage from 2001 to 2005 is counted nearly 31 percent and from 2005 to 2010 the growth of daily nominal wage climbed to 92 percent which is almost double. If we consider the price of rice to measure the purchasing powers as well a real income, initially workers able to obtain 4.56 kilogram by the daily wage of 63.5 taka. The purchasing power of labors discovered is in upward trend up to 2004. After

that notable fluctuation seems in the purchasing power due to change real income of the labor. It can be seen workers can purchase maximum 5.27 kilogram rice by their real income once only in 2003. From 2000 to 2003 the purchasing power of rice changed 15.6% which indicates the generous rise in welfare during this period. During the mid period between 2003 to 2006 purchasing power of rice changed negatively 2.08 with the rising level daily nominal wage. There is a sudden drop in welfare observed in this mentioned phase due to decline in rice equivalent wage.

From 2006 to 2010 purchasing power of rice or rice equivalent wage dramatically slumped by - 6.7 percent. During this time period daily nominal wage increased closely 72 percent but which cannot increase the welfare level at all. Now it is visualized that substantial increase in daily nominal wage unable to increase the rice equivalent wage of the workers which signifies the welfare reduction as well as significant fall in real income as well as purchasing power.

7. Summary of Findings

It is appeared in the study that there is a significant difference between the mean real wage of agriculture, general and manufacturing sector. No difference in mean real wage is found between agriculture and construction sector. Moreover, growth of manufacturing sector's real wage seems more than 25% higher than that of agriculture sector. This fulfills the condition of Lewis Model of switching surplus labor from agriculture to industrial sector. It is revealed that real wage in agriculture experienced steady growth upto 2008 but after 2008 the real wage in agriculture sector significantly increased. This happens due to high agricultural growth, rise in productivity, remittance inflow and injection of money to the rural Bangladesh by the govt. by the name of diverse social safety net program. It deserves special mention that rapid social safety net program and remittance underpin to jump the reservation wage of rural sector. Consequently sudden bounce in agricultural real wage appears into view.

Rising real wage in non farm sectors indicates the strong basement of manufacturing sector compared to agricultural sector. This is an indicator of creating more job opportunity in manufacturing sector in near future. Here, abandoned labor will get opening to move industrial sector for further job opportunities and transformation process of commercialization of agriculture will commenced in this way.

Furthermore, it is flickered in wage determination model that co-efficient of education and training variables are dominant and keeping effective role in wage determination both in rural and urban Bangladesh. It deserves special mention that minimal increase in real wage in agriculture compared to other sector unable to increase the rice equivalent wage for agricultural labor. Which exposed the welfare drop in agriculture sector.

8. Policy Implications

Though real wage determines the living standard and welfare of the working population, effective policy can stimulate the real wage to thrive national well being. There is enough room to adopt better policy to make the real wage reliable. So that informal employment will be lessened and no. of working poor is anticipated to be squeezed dramatically. Here is some policy option that may excite the real wage in the labor market of Bangladesh.

i) In order to reduce inequality in real wage of among the sectors incentives should be provided to increase the labor productivity and technical efficiency in backward sectors.

ii) Since real wage is lower in agriculture and construction sectors minimum wage policy can be implemented in these sectors to equalize the welfare of among the sectors.

lii) Increased public expenditure to improve human capital can boost up labor productivity in long run as well as can cause to increase real wage which can ensure better living standard of working population.

iv) It is more worthy to reform the social safety net program in rural areas. Injecting the money in productive purpose in rural areas is more effective rather than direct cash transfer program. This will fuel the real wage in agriculture sector.

v) Stimulus package is required to offer in labor incentive industry rather than highly capital incentive industries. i.e. incentive in motor parts industry rather than car producing industry will generate more employment.

vi) Endeavor need to be given to administer the inflation in such a way where real ways lies above the rate of price hike. So that people's welfare will not face downturn.

vii) Enhanced labor productivity and capital accumulation can play effective role to sustain reliable real wage in the long run. Thus, human

capital development and capital inflow need to be addressed in national strategy.

Finally, in order to increase real wage employment generation policy should be immensely prioritized because increase in real wage is truly unexpected in case of highly surplus labor economy.

Reference(s):

Allen, Robert C. 2001. The Great Divergence: Wages and Prices from the Middle Ages to the First World War. *Explorations in Economic History* 38: 411-47.

Allen, Robert C. 2007. Real Wages in the British Industrial Revolution. Working Paper 314. Department of Economics. Oxford University

International Food Policy Research Institute. 2013. Rising Wage in Bangladesh-Discussion Paper 01249. Development Strategy and Governance Division.

Kumer.Saten, et. al. 2009. Real Wages, Inflation, and Labor Productivity in Australia. Dept. of Business and Economics, Auckland University of Technology, Newzland

Robert. E. Locus, et al. 1986. Real Wage, Employment and Inflation. Working Paper. Carnegie-Mellon University. Washington, DC.

Scheidel. Walter. 2009. Real wages in early economies: Evidence for living standards from 1800 BCE to 1300 CE. Stanford Working Papers in Classics. Stanford University

Whelan. Karl.1999. Real Wage Dynamics and the Phillips Curve. Division of Research and Statistics.Federal Reserve Board

World Bank. 2011. World Bank Development Indicators. Washington, DC.