

“Public Expenditure, Employment and Poverty in Bangladesh: An Empirical Analysis”

By

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Draft of the research report prepared for the CPD-UNDP project
“Pro Poor Macroeconomic Policy”

PUBLIC EXPENDITURE, EMPLOYMENT AND POVERTY IN BANGLADESH: AN EMPIRICAL ANALYSIS

1. INTRODUCTION

Bangladesh has made some noteworthy progress in the matter of economic growth and poverty reduction since the early 1980s. In 2005-2006 GDP growth reached 6.6 percent from an average of 3.8 percent per annum in the 1980s. During this period, the share of population below poverty line has fallen from 62.6 percent in 1983-84 to 44.3 percent in 2000.

Economic growth, employment and wages are three fundamental factors that helped reducing poverty in Bangladesh. Government policy directed towards economic growth, creation of employment and improving wages play a crucial role in reducing poverty. Among these policies, government expenditures on education, health, infrastructure, and agricultural development have been most instrumental.

Economic theory provides rationale for government expenditure; correcting market failure and improving are the two primary ones. When a market economy fails to allocate resource efficiently, market failure occurs. One such example is the case of “externalities.” Government can curb negative externalities (for example, pollution) and promote positive externalities (for example, education and health) by means of regulation, taxation and subsidy, and public provision. Hence, the justification of government provision of pure “public” good is clear.

Poverty reduction considerations may also lead the government to provide “private goods”- those which are disproportionately consumed by the poor – through transferring resources to a targeted group of people who are unable to make provisions by themselves due to market failure. Theoretically, a market based economy can distribute income in a socially unacceptable ways, and in these cases the government often feels obligated to protect the poorest vulnerable segment of the society through interventions. Food and housing services are some of the main anti-

poverty program. But none or very few society has managed to reduce poverty through direct welfare transfers alone. Education and health expenditures which help reduce human poverty and increases employability and productivity are indirect but more sustained way of reducing poverty.

Government spending is also needed to provide an enabling environment for the private sector. Much of the impact of public expenditure can be viewed as establishing infrastructure for economic growth in the broadest sense – social infrastructure like education and health and physical infrastructure like roads and highways, energy and power, and fertilizer. For the market to operate smoothly to create growth these infrastructures are needed and yet in most of the cases it is beyond the capacity of the private sector to provide for these. Hence, it is usually the government who provides for these infrastructures – here lies the crucial link between public expenditure and poverty reduction.

There has been some prior studies that analyzed the impact of public spending – especially that on poverty reduction. One such study by Ritva Reinikka and Paul Collier (2001) funded and published by the World Bank, used data from a series of household surveys in Uganda from 1992 – 99, found that education, access to roads, and access to extension services have a major positive impact on agricultural production, which has a connection with reducing rural poverty. Similar study, but using a different method by Fan, Zhang and Rao (2003) of the International Food Policy Research Institute using district level data for 1992, 1995 and 1999, estimated the effects of different types of government expenditure on agricultural growth and rural poverty in Uganda. They found that government expenditures on agricultural research and extension services and that on rural roads have impacts on poverty reduction. These studies alongwith some others suggest that public investment must play even greater role in fostering future economic growth and poverty reduction. However, different types of expenditure have differential effects on growth and poverty reduction in different countries. At the International Food Policy Research Institute some more studies have been conducted along this theme for different countries but using secondary data at the national or local government level. These studies are Fan, Hazell, and Thorat (2000) on India; Hao and Fan (2001) on Viet

Nam; Fan, Zhang, and Zhang (2002) on China; and Jitsuchon, and Methakunnavut (2003) on Thailand. All these countries achieved remarkable results on growth and poverty reduction in the last two decades in Asia. Although such secondary data are available on Bangladesh, there has been no such previous study to systematically explore the relation between “public expenditure” and poverty reduction.

This paper endeavors to formally establish a link between public expenditure, employment and poverty reduction and empirically test the propositions for data available in Bangladesh. After reviewing relevant literature, this paper develops an analytical framework and applies it to analyze the impact of different types of public expenditures¹ on poverty reduction for period of 1995 – 2006. Particular attention is paid to the major determinants of poverty. These are growth, employment and wages – variables which have been propounded to have considerable impact on the reduction of poverty by studies carried out by the International Labor Organization (ILO) and United Nation’s Development Program (UNDP). Focus, of this study, has been to see how different public expenditures affect these variables and thus affect poverty. This study is organized as follows: first, we provide an overview of the trend in poverty and public expenditure in the next section. Here we propose a link among public expenditure, employment and poverty reduction in Bangladesh. In the following section we provide a review of different types public expenditures in Bangladesh. Third we propose an analytical framework for the analysis. Fourth, empirical estimation and results are discussed followed by conclusion with policy recommendation.

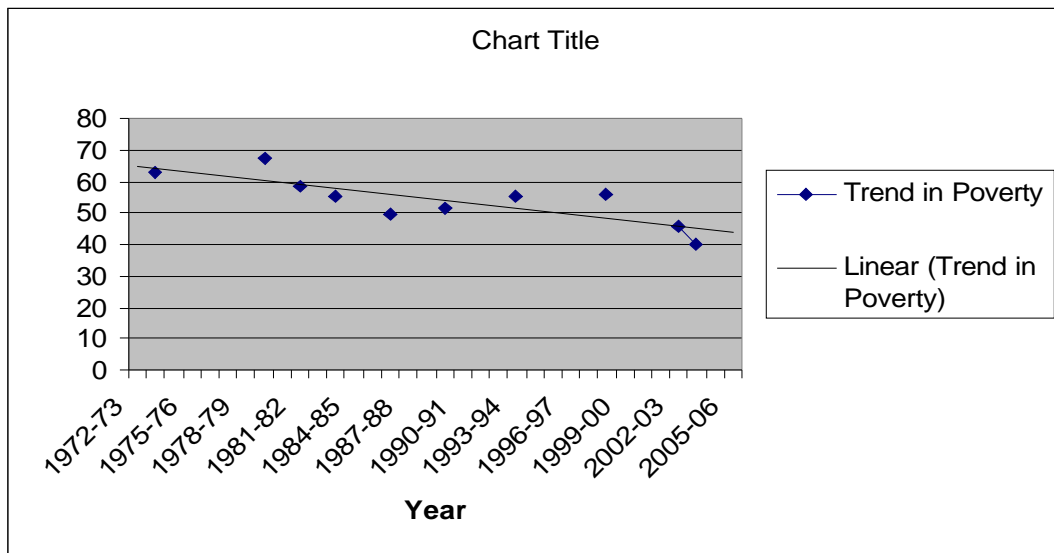
¹ By public expenditure we refer to the actual expenditure recorded on the government’s annual development program (ADP) only. It excludes current expenditure.

2. PUBLIC EXPENDITURE AND POVERTY REDUCTION: A LINK

This section reviews public expenditure and poverty in Bangladesh juxtaposed with growth, employment and wages.

Trends in Poverty:

Bangladesh gained independence in 1971 from Pakistan through nine months of war of freedom. Prior to gaining independence Bangladesh was already a densely populated poor country with 75.6 million people with a per capita GNI of 200 US dollar. Having lost much of its physical and social infrastructure in the war of independence, Bangladesh the ‘test case of development’, had a tough time for future in the beginning. The proportion of national population living below poverty line 1973/74 was as high as 74 percent. In 2005, the proportion of population below poverty line has fallen to 40 percent with a per capita GNI of 482 US dollar. In span of a little over three decades, Bangladesh was successful in reducing the number of poor people by a third and more than doubling its per capita income.

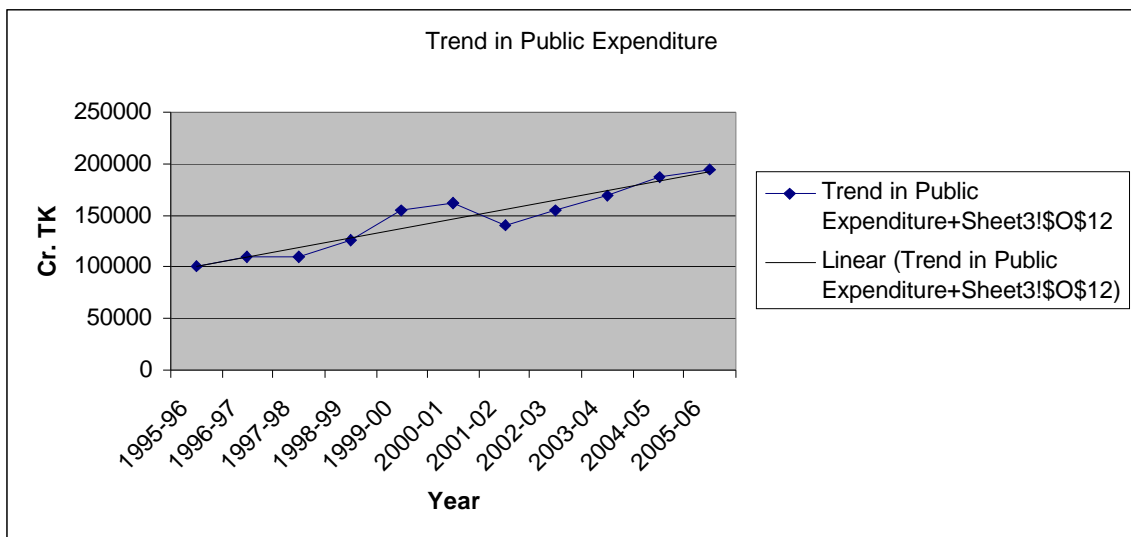


Trends in poverty have some discerning character in Bangladesh. Income poverty trends in the eighties and early nineties have the following pattern. Between 1983/84 and 1985-86 the incidence of poverty fell from 62.6 percent to 55.7 percent which a 7 percentage point reduction in poverty. Another impressive 8 percentage point reduction in poverty was achieved in just four years when poverty fell to 47.8 percent

in 1988/89. The dynamics of poverty somewhat stagnated after this time. In 1995/96 the proportion of people below poverty line was estimated to be 47.5 percent meaning between 1988/89 to 1995/96 only 0.3 percentage point reduction in poverty was achieved. Most recent estimate of poverty is of 2005 which indicates that proportion of poor people is 40 percent. That leads to an impressive reduction of 7.5 percentage point in poverty between 1995/96 and 2005.

Trends in Public Expenditure:

In the time period of 1973/74 to 2005, public expenditure rose steadily in Bangladesh. From early eighties up to 1989/90 public expenditure increased at an almost constant rate where year to year variability of expenditure was considerably lesser. After that period, in the decade of 1990s, expenditures rose more sharply. The rate of growth of public expenditure in the period between 1991/92 to 2000/2001 was much higher compared to the previous decade. The volatility of expenditure also increased during this time. This trend continues up to 2001/2002 when expenditure fell a little only for a short time and vigorously picking up in 2003 and continued to grow till 2005.



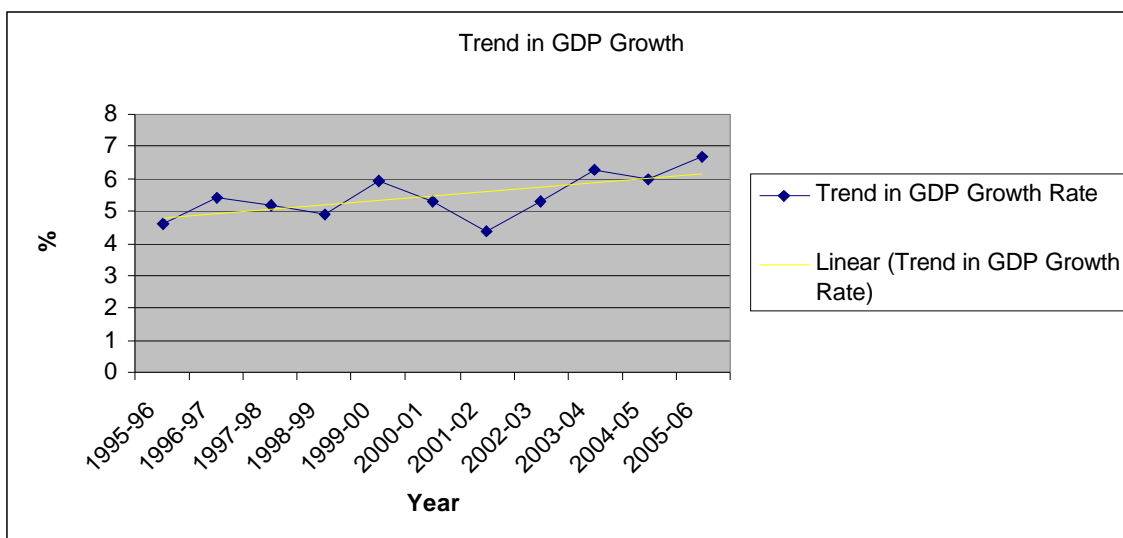
Trends in Growth, Employment and Wages:

The long run trend in poverty is falling but in contrast the long run trend in public expenditure is rising. If we are to suggest any link between these two, it has to come through some channels through which public expenditure reduces poverty. There are evidences in literature that countries which are successful in achieving poverty reduction were also successful in achieving sustained high growth. However growth is not alone sufficient in itself – countries with much better record of reducing poverty had much higher employment intensity of economic growth than those with not so impressive record of poverty reduction and as such employment serves as a key link between economic growth and poverty reduction (Islam 2001, 2003, 2004).

Theoretically, the link between public expenditure and poverty comes from three sources: growth, employment and wages. Increases in public expenditure increases aggregate demand in the economy. Demand for labor, being a derived demand, also increases, raising the level of employment and productivity. Higher employment and productivity leads to two paths. One leads to a rise in wages and thus contributing to reduction in poverty and the other leads to acceleration in economic growth which in turns leads to rise in public expenditure. The schematic diagram of the link between public expenditure, employment, growth and wages is modeled in the appendix.

Trends in Economic Growth

The early 1970s were a period of economic and political turbulence. By the late 1970s the economy was stabilized and various market based reforms were introduced. But it was in the mid 1980s that the economy started to grow at a steady pace of 4.5 percent per annum. Growth started to accelerate in the early 1990s and the economy grew at 5.6 percent per annum during the period 1995-2000. Bangladesh economy moved into a robust growth path of around 6 percent in the mid 2000s. During this period of 1985 to 2005 when the economy took a transition from slow growth to accelerated growth, success in poverty reduction was especially noteworthy. (see Table 7 and 10)



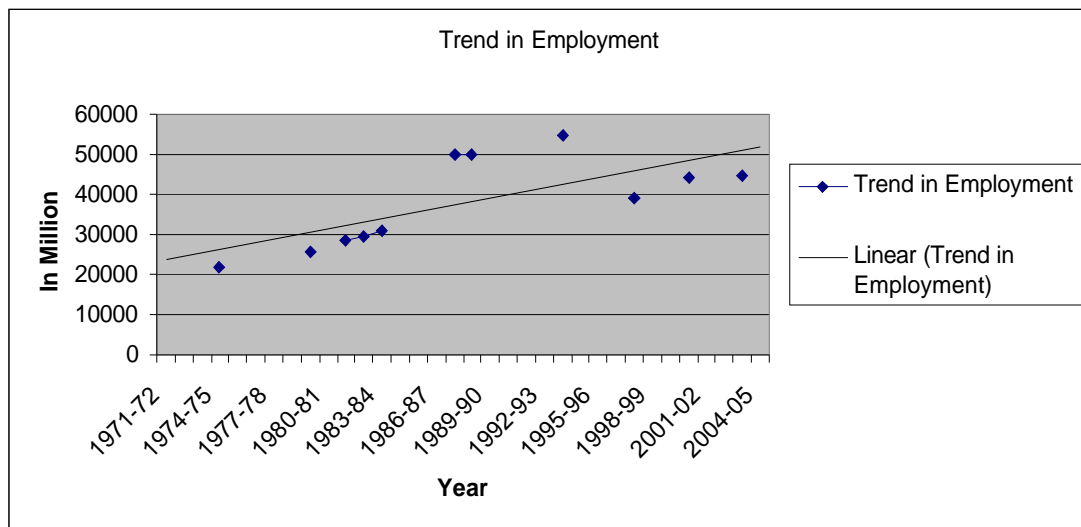
Several factors can be attributed to account for such growth performance. First, with the successful completion of the World Bank-IMF supported structural adjustment programs in the late 1980s and early 1990s, the country, through the adoption of prudent – basically tightened - monetary and fiscal policies, achieved macroeconomic stability throughout the 1990s. Second, both public and non-public (NGOs) intervention in the economy led to the expansion education and health service to the people. This created a better educated, healthier and skilled labor force congenial to the need of the private sector which contributed to progression of the higher growth path. Both these involved public expenditure shifting and expenditure switching from low productivity to higher productivity sectors. Thirdly, with the gradual opening up of the economy, it was possible to shift resources towards more employment intensive non-traditional exports, especially ready made garments that expanded manufacturing activities and related services. Finally, steady increase in the workers’ remittance helped to boost the economic activities in the construction, retail trade and services sector.

Steady economic growth since the mid 1980s has brought about a significant structural change in the economy in favor of the non traditional sector (see Table 8). Agriculture which was traditionally the dominant sector, presently accounts for 19 percent of the GDP. With this transformation process, the service sector has gained

the most. Whereas shares of small scale manufacturing and construction sectors in GDP rose steadily.

Trend in Employment:

From early 1970s to early 1980s, employment growth was sluggish in Bangladesh or it might as well have a slightly negative trend. However from 1980 to 1990, there is a very sharp remarkable increase in employment, the trend in employment growth very steep during this period. From the high level employment of employment 1990, there is a slight decline in 1995. From there, total employment has not changed much in 2004. On average, the trend in employment is rising from mid 1980s to mid 2000s (see Table 9).



In the pattern of employment structure it is found that in Bangladesh there is a low level of formal employment and an overwhelming dominance of self employment and daily wage employment in the 1990s.

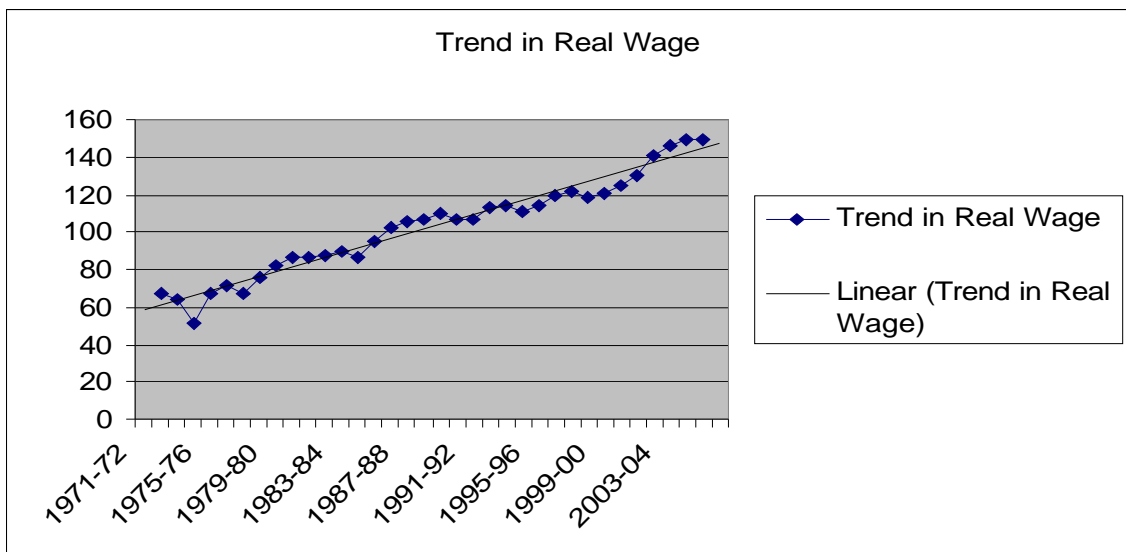
Given the predominant economic activity, agriculture remains the main source of employment for an increasing labor force of about 60 millions (45 percent of the total population) in 2000. Though, agriculture would employ about 80 percent of the labor force previously, in the 1990s this share gradually declined to the level of 60 percent and still this the dominant source of employment in the economy. There has been some shift of employment from the agriculture to non-agricultural sectors

nonetheless. This shift largely occurred in construction, trade, transport, community and personal services (see Table 9).

The structural transformation process in employment over the past decade and a half was unique in the sense that it was the service sector rather than the manufacturing that absorbed the incremental labor force.

Trend in Real Wages:

The trend in wages in Bangladesh is found from the Wage Rate Index compiled by the Bangladesh Bureau of Statistics by counting 1969-70 as base year. In 1997-98 the nominal wage rate index stood at 2,141 which grew to 3507 in 2005-06. Compared to 2004-05, the nominal index was up by 6.50 percent in 2005-06. The real wage index was 146 in FY 2003-04. The index stood at 149 in 2004-05 growing at the rate of 2.05 percent and in 2005-06 the index remain same i.e. 149. It is observed from the Nominal Wage Rate Index that in 2005-06 the growth rate of agriculture, manufacturing and construction sector index is higher than that of the previous fiscal year. In terms of overall trend, real wage rate index increased from 60 (not shown in table) in 1974-75 to 149 in 2005-06. This provides evidence to support the view that there has been a steady increase in the level of real wages rate in Bangladesh.



3. TRENDS AND COMPOSITION OF PUBLIC EXPENDITURE IN BANGLADESH: 1995 – 2006

Total Public Expenditure:

Bangladesh's public expenditure (see Table 11), at current prices, increased from 23165 crore taka in 1995-96 to 64383 crore taka in 2005-06, a growth rate of around 1.8 percent per annum during the period 1995 – 2006. However, non-development expenditure rose more than development expenditure during this period. Non-development expenditure registered a growth rate of 2.4 percent per annum, rising to 37333 crore taka in 2006 from 11712 crore taka in 1995. The growth rate of development expenditure during the same time period is a little less compared with its non – developmental counterpart. Development expenditure of the government rose from 9866 crore taka in 1995 to 24500 crore taka in 2006, a growth rate of around 1.6 percent per annum.

As a percentage of GDP, public expenditure in Bangladesh did not have any discerning trend rather it fluctuated. The ratio fell in 1997 to 12.92 percent from 13.33 percent in 1995. From 1997 it slowly but steadily rose to 14.92 percent in 2001 but fell again to 14 percent in 2002. Public expenditure/GDP ratio oscillated from 13.93 percent in 1995 to 15.47 percent in 2006. Although it was not uniform for both development and non development expenditure. The share of non-development expenditure as a percentage of GDP increased to around 9 percent in 2006 from 7 percent in 1995. In contrast, the ratio of development expenditure as percentage of GDP actually marginally fell during the same time period. The development expenditure/GDP ratio decreased to 5.89 percent in 2006 from 5.93 percent in 1995.

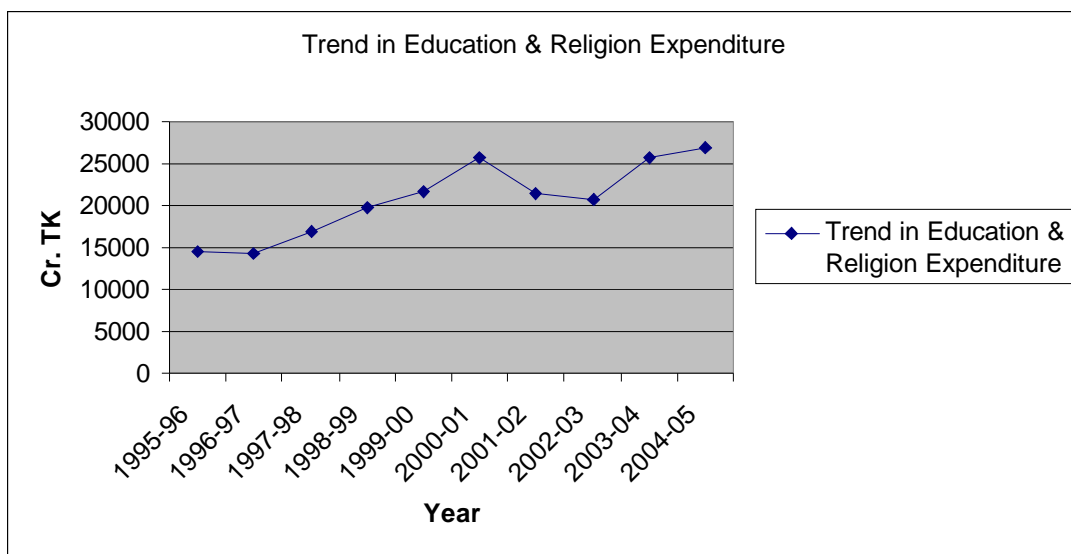
Composition of Non-development Expenditure:

Three main sources of non-development expenditure are i) pay and allowances, ii) subsidy and current transfer and iii) total interest payment on domestic and foreign loan. In 2005-06 these shares were 26.5 percent, 31.4 percent and 18.9 percent respectively. Expenditure on pay and allowances was 30 percent of total non-development expenditure. In 2002-03, 2003-04 and 2004-05 these ratios went down

to 28.8, 27.9 and 26.3 percent respectively. In 2001-02, the expenditure on subsidy and current transfer accounted for 26.1 percent of total non-development expenditure. In 2002-03, 2003-04 and 2004-05, the expenditure on subsidy and current transfer accounted for 28, 28.8 and 31.3 percent of total non-development expenditure respectively. In 2001-02, the share of interest payments on foreign and domestic loans on total non-development outlay was 19 percent. In 2002-03, 2003-04 and 2004-05, the shares of interest payments on foreign and domestic loans in total non-development outlay were 22.0, 20.6 and 19.5 percent respectively.

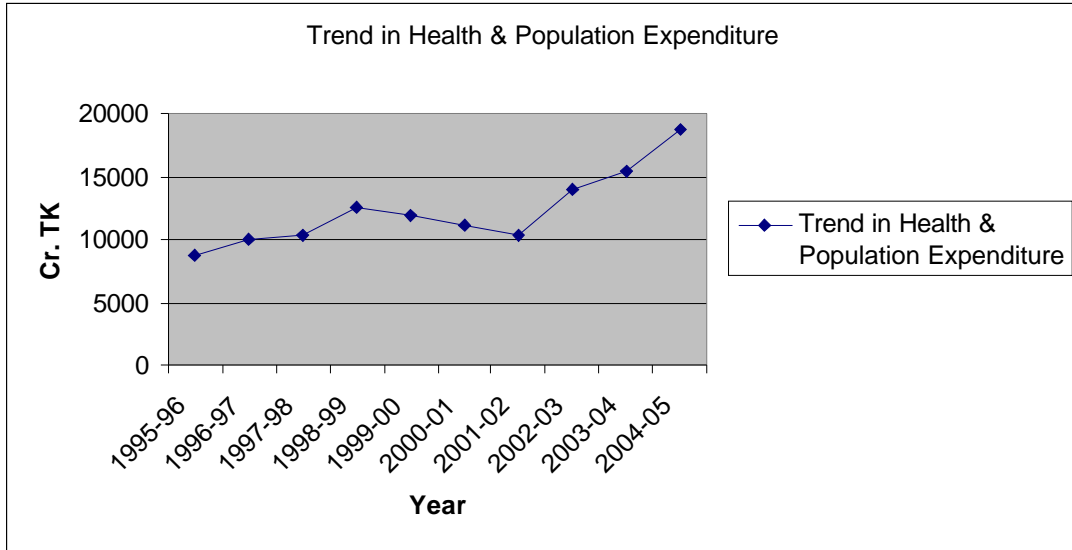
Composition of Annual Development (ADP) Expenditure:

In the period 1995-96 to 2005-06, actual expenditure against the revised allocation of ADP was around 90 percent (see Table 12). Composition of government development expenditure reflects government priorities and policies. In Bangladesh the main objectives of public expenditures are to improve the living standard of the people, develop human resources and physical infrastructure and reduce poverty. Actual development expenditure in current prices rose steadily from 6024 crore taka 1991-92 to 19472 crore taka in 2005-06 which means a growth rate of 2.1 percent per annum and more than a three fold increase in absolute term. In 2005 – 06, the top four expenditures in Bangladesh were rural development, power, transport, and education respectively (see Table 13).

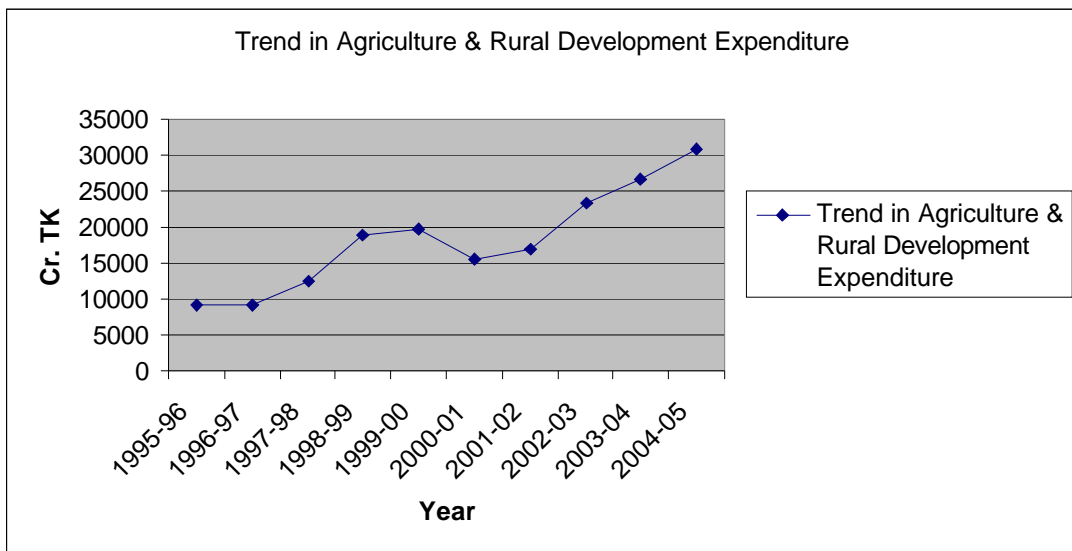


There have been some changes in the relative spending priority in Bangladesh. In 1995-06 the highest priority was in the transport sector which accounted for 20.1

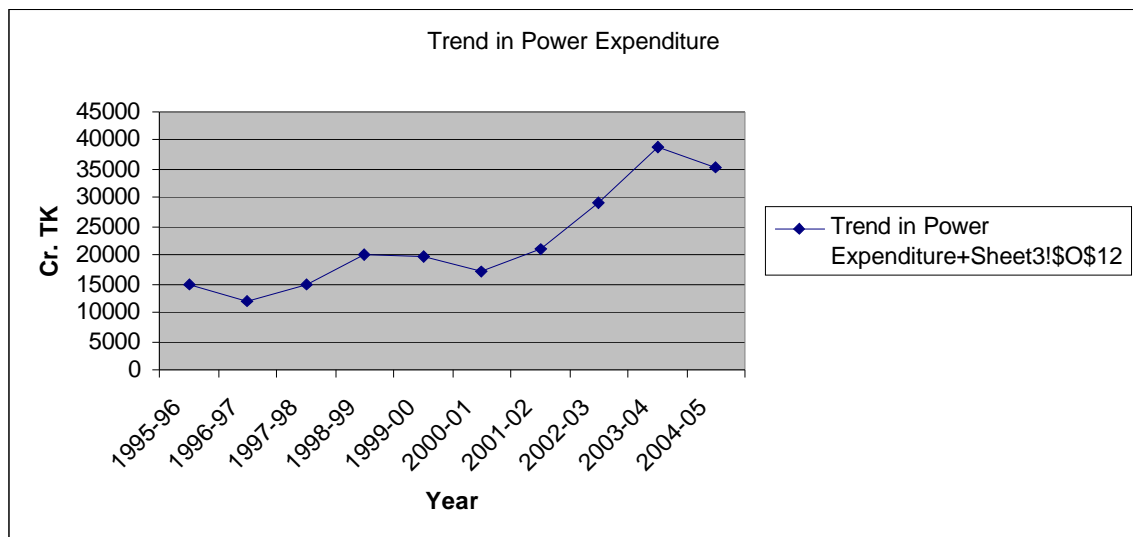
percent of the ADP, followed by power sector which accounted for 13.7 percent of ADP marginally ahead of the education sector which accounted for 13 percent. Relative to this, rural development sector only accounted for 6.8 percent of ADP which was just lagging behind the health sector accounting for 6.9 percent of ADP.



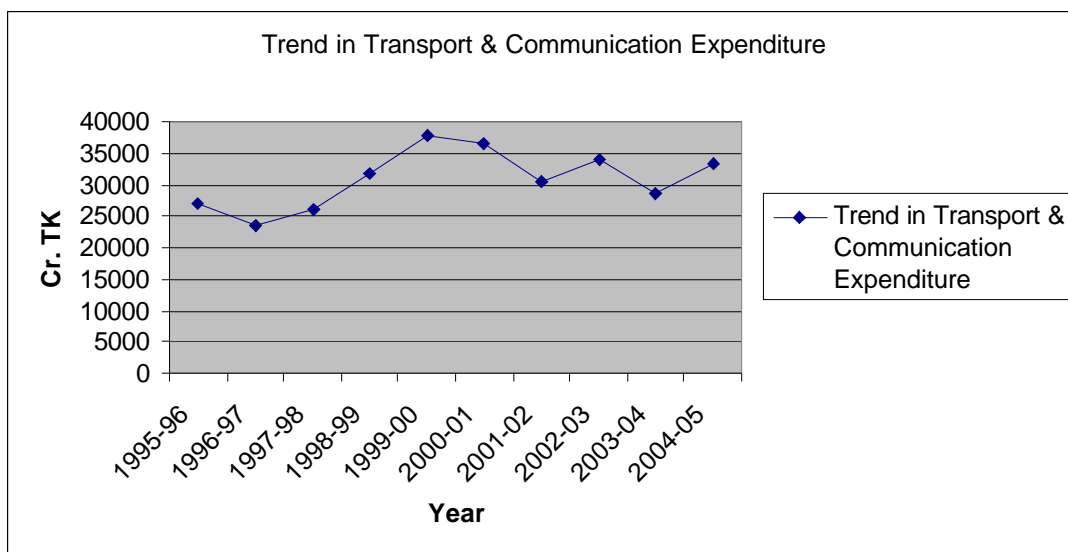
In contrast, rural development was the highest priority sector in 2005 – 06 accounting for 19.07 percent of the allocation in ADP. As a percentage of ADP, rural development sector managed to score a threefold increase in its share – from 6.8 percent in 1995 to 19.07 percent in 2006. The share of the power sector in ADP did not score such a dramatic rise but it rose nonetheless to 18.08 percent in 2006 from 13.7 percent in 1995.



The share of transport sector in ADP actually fell in 2005 to 15.21 percent from 20.1 percent in 1995. Education has been a sector which got the priority through out these years. The share of Education had an increasing trend – rising from 13 percent of ADP in 1995 to 14.49 percent in 2006. This summarizes the trend in spending priority of the government in the four major sectors over the time period in question. Other than these four, two sectors that deserve close scrutiny are health and agriculture.



The share of agriculture in ADP has been constant around 5 percent. There seems to be no shift in priority over this sector. As a percentage of actual development expenditure, agriculture’s share in ADP in 1995 was 4.5 percent rising marginally to 4.91 percent in 2005 – 06. The priority of the spending share of the health sector in ADP has also risen over the period but its growth was rather slower comparable to that of education sector. The share of health and population in 1995 accounted for 6.9 percent of ADP. This steadily climbed to 8.17 percent of ADP in 2004 – 05 but abruptly fell to 5.12 percent in 2006 which was lower than its 1995 ratio.



Budget and Financing:

Formulation of budget in Bangladesh is influenced by the objective of accelerated economic growth and poverty reduction. Because of existing resource constraints, government expenditure typically exceeds revenues and thus leads to budget deficits. The trend in budget deficit as a percentage of GDP has been hovering around 4.5 percent upto 2005 – 06. Two major observations - the trend in net foreign financing of deficit has been falling during 1995 – 2006 and the trend in net domestic financing is rising for the same time period (see Table 14)

Domestic Resources for ADP:

The contribution of domestic resources towards financing of ADP shows an upward trend. In 1994-95, 43 percent of ADP was financed by domestic resources, whereas in 2005 – 06 it was 50.23 percent (see Table 15).

4. RURAL DEVELOPMENT, EDUCATION AND HEALTH: PRO - POOR EXPENDITURE

This section extends the analysis of expenditure on rural development, education, and health terming them as pro poor. Such expenditures create public and social capital conducive for long term economic growth and poverty reduction.

Accelerated Rural Infrastructural Development:

Government policies in Bangladesh have traditionally emphasized development of the rural economy as a means to alleviate poverty and contain the impact of natural calamities. In the 1970s the emphasis was on direct market interventions and large capital spending on flood control, irrigation and drainage projects. In the 1980s, most public expenditures focused on broad agricultural development, with relatively low emphasis on rural infrastructure. In the 1990s the development of physical infrastructures—including roads, bridges, culverts, and market places—was singled out as the major element of the new rural development strategy which explains the dramatic rise in the priority of rural development sector in annual development (ADP) expenditure.

The rise in relative importance of rural development sector in ADP prompted the Local Government Engineering Department (LGED) to initiate numerous projects for the development of feeder roads, sub-district connecting roads and nascent market/growth centers throughout the country. Indeed, the creation of LGED in itself as the new focal point with empowered centralized authority outside the direct day-to-day scrutiny of the Ministry of Local Government for overseeing the speedy implementation of the road infrastructure projects was a major institutional breakthrough without which the rapid development of the country-wide rural road network would not have been possible. The road development projects, connecting 1400 of the 2100 growth centers/markets, contributed to increasing farm and non-farm output, employment and income, especially of the rural poor and women. Moreover, the functionally landless and small farmers gained a larger share of the increase from crops, wages, livestock and fisheries (World Bank 1996). Other

positive impacts of the rural infrastructure development policy included the rapid growth of non-farm sector employment, roadside shops, petty trading etc. (Mondal 2002).

Education:

Bangladesh's achievements in education over the last two decades have been impressive (see Table 2), especially when seen against the backdrop of the performance of other countries in the region. Major successes include (a) rapid expansion of primary education – the gross primary enrolment increased from 72 per cent in 1990 to 91 per cent in 2000 (b) a narrowing of disparity between rural and urban primary enrolment and (c) the closing of the gender gap, including the very poor. Moreover, enrolment in secondary education expanded at an annual rate of 10 per cent during the 1993-99 period. Roughly 9 out of every 10 children eventually enrol in primary school, and Bangladesh has achieved levels of primary and secondary gross enrolment similar to those in countries with higher per capita income, such as Vietnam, Thailand and Indonesia (BIDS 2001; GoB 2003; World Bank 2002; World Bank 2003).

Three key public policies underscored successes in primary and, in recent years, secondary education in Bangladesh. These include (i) sustained injections of public resources, (ii) effective partnership with non-government institutions for service delivery and (iii) provision of subsidies to influence the demand for education in favor of the poor. The greater emphasis on primary education, especially girl's education, has been a consistent feature of the successive regimes, more explicitly after transition to democracy in 1991. Expenditure in education has been the largest single item in the revenue and development budget, and has become an important part of the electoral competition. Thus, the proportional allocation of education has continuously increased over the past two decades: the matched share has actually doubled from 8 per cent to 16 per cent between early eighties and late nineties.

Health:

Bangladesh's achievement in health sector is also impressive (see Table 1 – 6). Apart from increasing life expectancy at birth of both male and female to 61 years in 2000 from 46 years in 1975, there are three other indicators which can capture the broad trends in the area of public health relevant to the concerns of pro-poor growth. These are child mortality, child malnutrition, and maternal malnutrition. The historical trends in infant mortality culled from different sources and surveys show a very high level of infant mortality prevailing in the 1950s and 1960s. The IMR started declining slowly since the mid-seventies; by 1985, it stood at 121 compared with 173 in 1973. It is only after 1989 does one see a definitive and a faster trend of decline, with dramatic improvements in child mortality in the nineties as the level of IMR dropped to 51 in 2002. This has prompted some observers to rank the country as the “fastest reducer of infant mortality” in the nineties (Stern 2002). In Bangladesh, the prevalence of child malnutrition has gone down substantially over the last decade, with faster decline recorded for the second half of the nineties. The proportion of children (6-71 months) underweight has declined nationally from 72 per cent in 1985/86 to 51 per cent in 2000. The extent of improvement was not restricted to the category of moderate malnutrition alone, but also occurred at the level of severe malnutrition, though the progress was slightly slower in case of the latter. Improvement in child malnutrition is closely linked with improvement in maternal malnutrition. The status of maternal nutrition has improved quite noticeably over the nineties. While the share of malnourished mothers was 52 per cent in 1996/97, it is now 42 per cent in 2000 (Sen and Ali 2004).

The national health program in Bangladesh has over the years focused on the provision of affordable rural primary health care (through Upazila Health Complexes and Union Health and Family Welfare Centres) and on developing partnerships with NGOs. NGOs have been an extremely important source of health successes in Bangladesh, especially in the area of family planning and immunization services. Consistent with the long-standing emphasis accorded by public policy to human resources development, public spending on health has been increasing in both

nominal and real terms over the last three decades.. The distribution of public health spending was also found to be pro-poor: the health subsidy represents 1.45 per cent of the average per capita expenditures of the poor and 0.8 per cent of the non-poor (World Bank 2002).

5. CONCEPTUAL FRAMEWORK AND MODEL

It has been discussed in previous section how public expenditure affects poverty reduction. Public expenditure typically affects poverty through three channels – growth, employment and wages. It also helps to increase national productivity which in turn helps to increase wages and employment. Increase in agricultural output through public investment in rural infrastructure often leads to lower food price which indirectly helps to reduce the incidence of poverty.

There have been some previous studies on public expenditure and poverty reduction. However the objective and approach of those studies not always coincided to the model proposed in this paper. For example, the study made by Foster and Mijumbi (2002) focused on the relation between public expenditure and on the performance of budget implementation. The other study by Appleton (2001a and b) the dynamics of poverty changes and public expenditure without providing a linkage between these two. Deininger and Okidi (2003) analyzed the impact of various infrastructure, education and health variable on farmers' income and poverty. Fan, Hazell, and Thorat (2000) and Fan, Zhang, and Zhang (2002) constructed econometric models to estimate the effects of government spending on poverty reduction through various channels using secondary data for India and China. Both these countries had data on disaggregated government spending.

Building on such previous studies, this paper develops and adapts a simultaneous equations model to estimate the effects of public development expenditure and poverty reduction in Bangladesh for the period 1995 – 96 to 2005 – 06.

Equations (1) to (4) give the formal structure of the model.

$$P = f(ZGDP, EMPT, WAGES) \quad (1)$$

$$ZGDP = f(INVDP, ZPOP, EDUEX, HLTHEX, TRCEX, PWREX, ARDEX) \quad (2)$$

$$EMPT = f(ZGDP, EDUEX, HLTHEX, TRCEX, PWREX, ARDEX) \quad (3)$$

$$WAGES = f(ZGDP, EDUEX, HLTHEX, TRCEX, PWREX, ARDEX) \quad (4)$$

Equation (1) gives the hypothesized major determinant of poverty (P) – which include GDP growth (ZGDP), level of employment (EMPT), and level of national wages (WAGES). The nexus between wages, employment, growth and poverty reduction is well documented in the researches of various developmental organizations. Various papers at ILO-IEPDP such as A. R. Khan (2001, 2004 and 2005) and Rizwanul Islam (2003 and 2004) have discussed this issue along with other paper such as A. R. Khan (2005) under the joint ILO-UNDP program ‘promoting employment for poverty reduction’ - growth reduces poverty via the means of more jobs and better wages. Hence all the arguments of equation (1) are postulated to reduce poverty.

Government expenditure is hypothesized to reduce poverty via affecting the three major determinants of poverty as proposed by equation (1). GDP growth (ZGDP) equation is given by equation (2). Here ZGDP is postulated to be determined firstly by investment/GDP ratio (INVDP) and population growth (ZPOP) which are standard in growth literature. Various other yearly disaggregated public expenditure variables are then added to the growth equation-these include education expenditure (EDUEX), expenditure on health sector (HLTHEX), expenditures on transport and communication (TRCEX), expenditure on power sector (PWREX) and on agricultural and rural development (ARDEX). Adding these public expenditure variables to the growth equation will enable us to see how growth is affected by public expenditure.

Equation (3) gives us employment determination relation which depends on how much growth (ZGDP) is generated and on all other various public expenditure variables. Similarly equation (4) gives us the wage setting function which depends on rate of growth of GDP (ZGDP) and on all other public expenditure variables. Note both employment and wages are affected by public expenditure as well as by rate of growth of the economy which in turn affected by public expenditure.

Marginal Impact of Public Expenditure on Poverty Reduction:

By totally differentiating equations (1) – (4), we can derive the marginal impact of any government expenditure variable on poverty reduction. For example if we wanted to know the “impact of education expenditure (EDUEX) on poverty reduction”, we could derive this by:

$$\begin{aligned} dP/ dEDUEX &= (dP/dZGDP)(dZGDP/ dEDUEX) \\ &+ (dP/dEMPT)(dEMPT/ dZGDP)(dZGDP/dEDUEX) \\ &+ (dP/dWAGES)(dWAGES /dZGDP)(dZGDP /dEDUEX) \\ &+ (dP/ dEMPT)(dEMPT/ dEDUEX) \\ &+ (dP/ dWAGES)(dWAGES/dEDUEX) \end{aligned} \quad (5)$$

The first term of the right hand side of equation (5) measures the direct impact on poverty of higher GDP growth due changes in educational expenditure. The second and the third terms of equation (6) capture indirect impact on poverty through changes in employment and wages due to growth of GDP as a result of changes in education expenditure. The fourth and the fifth terms show the direct effects on poverty as a result of higher employment and wages arising from public expenditure on education.

6. DATA, MODEL ESTIMATION AND RESULT

Data:

This study estimated the proposed model for the period 1995 – 96 to 2005 – 06. Poverty data is based on DCI (direct calorie intake) method of 2200 calorie per day. Both poverty and employment data are gathered from various BBS publication for various years. However, note that we do not have time series data on poverty and employment in Bangladesh. LFS data on national employment for the years 1983/84, 1984/85, 1990/91, 1995/96, 1999/00, 2002/03 and 2005/06 are available. Based on these trends, this paper has interpolated the time series of employment data for whole period under consideration. Similarly poverty estimates based on DCI method are available for the various years of 1983/84, 1985/86, 1988/89, 1991/92, 1995/96, 1999/00 and 2004/05 and like employment, this study also interpolated the time series of poverty from the trends of these yearly data for the time period of study. Time series data on disaggregate level public development expenditure for the variables included in the model were taken from Bangladesh Economic Survey, Ministry of Finance, GoB for the period 1995 – 96 to 2005 – 06. Data on real wages for the same time period is taken from the same source. The time series for investment/GDP ratio and growth of population is taken from World Penn Tables.

Model Estimation and Results:

Using seemingly unrelated regression (SUR) the system of four simultaneous equations (1) – (4) were estimated (see results of estimation in Table 16). The estimated poverty equation (Equation 1) shows that growth of GDP and employment are both significant factors in determining poverty in Bangladesh. The regressors of equation 1 which are also the major determinant of poverty have the correct signs as well – increase in their values tends to reduce poverty as suggested by the negative signs on the estimated coefficients of ZGDP, EMPT and WAGES. The estimated coefficient of ZGDP in (1) suggest that an 1 percent increase in growth can lead to a 0.356 percentage point reduction in poverty significantly. Similarly a unit (i.e. 10 million) increase in employment can lead to a significant reduction in poverty

equaling 0.271 percentage point. On the contrary, according to (1) wages do reduce poverty but it is not significant.

In order to see the impact of public expenditure on poverty, equations (2), (3) and (4) were estimated. The estimated growth equation (Equation 2) shows that government expenditure education, health and rural development significantly affects growth with elasticities of 0.126, 0.161, and 0.245. In terms of magnitude, agriculture and rural development has higher impact on growth. However the estimated coefficient on HLTEX and ARDEX are only weakly significant compared to that of EDUEX as can be seen by their reported t-values. The results show that public investments on education, health and rural infrastructure have significantly contributed to growth directly, and towards poverty reduction indirectly.

Estimation of both equations (3) and (4) shows that growth of GDP significantly affects employment and wages. The employment and wage elasticity of growth is estimated to be 0.172 and 0.088 respectively. Other than this, the estimation of equation 3 suggests improved agricultural and rural development expenditure significantly affects employment with the estimated coefficient being 0.234. None other variables are significant. As for equation 4, health expenditure has a marginally significant bearing on determination of wages with an estimated coefficient of 0.023 and all the other expenditure variables being insignificant.

Calculation of Marginal Impact of Public Expenditure on Poverty Reduction:

According to formula of equation (5) outlined in the previous section, it is possible to calculate the marginal elasticity of the increase in education expenditure to the reduction of poverty as:

$$\begin{aligned}
dP/ dEDUEX &= (dP/dZGDP)(dZGDP/ dEDUEX) \\
&+ (dP/dEMPT)(dEMPT/ dZGDP)(dZGDP/dEDUEX) \\
&+ (dP/dWAGES)(dWAGES /dZGDP)(dZGDP /dEDUEX) \\
&+ (dP/ dEMPT)(dEMPT/ dEDUEX) \\
&+ (dP/ dWAGES)(dWAGES/dEDUEX)
\end{aligned} \tag{5}$$

The right hand side terms of equation (5) is estimated through equations (1) to (4).

$$\begin{aligned}
dP/ dEDUEX &= (- 0.356)(0.126) + (- 0.271)(0.172)(0.126) + \\
&(- 0.196)(0.088)(0.126) + (- 0.271)(0.152) + \\
&(- 0.196)(0.133)
\end{aligned}$$

The product of the coefficient of the last three terms of right hand side is zero because the estimated coefficient of $dP/ dWAGES$ and $dEMPT/ dEDUEX$ are statistically insignificant. Hence,

$$\begin{aligned}
dP/ dEDUEX &= (- 0.356)(0.126) + (- 0.271)(0.172)(0.126) \\
&= (- 0.045) + (- 0.006) \\
&= (- 0.05)
\end{aligned}$$

Therefore, the calculation shows, a unit increase in education expenditure would reduce poverty by 0.05 percentage point. Using exactly the same method, the poverty elasticity of changes in health expenditure is

$$\begin{aligned}
dP/ HLTEX &= (- 0.356)(0.161) + (- 0.271)(0.172)(0.161) \\
&= (- 0.057) + (- 0.043) \\
&= (- 0.10)
\end{aligned}$$

That is a unit increase in health expenditure reduces poverty by 0.10 percentage point implying the poverty reduction elasticity of health expenditures is higher than that of education expenditure.

The poverty reduction elasticity calculated for agricultural and rural development expenditure is:

$$\begin{aligned}
dP/ dARDEX &= (- 0.356)(0.245) + (- 0.271)(0.172)(0.245) + \\
&(-0.271)(0.234) \\
&= (- 0.087) + (- 0.011) + (- 0.063) \\
&= (- 0.16)
\end{aligned}$$

That is a unit increase in agriculture and rural development expenditure accounts for 0.16 percentage point reduction in poverty, which is the highest among all the elasticities calculated so far.

The elasticities on poverty reduction of other public expenditure variables that is power (PWREX) and transport and communication (TRCEX) cannot be calculated as they are not significant on the system of equations.

Table 16: Estimation of system of equations (1) – (4)

$$(1) P = -0.356ZGDP - 0.271EMPT - 0.196WAGES \quad R^2 = 0.391$$

(- 4.04)*
(-2.75)*
(- 0.98)

$$(2) ZGDP = 0.345INVDP + 0.228ZPOP + 0.126EDUEX + 0.161HLTEX$$

(4.75)*
(3.21)*
(3.65)*
(2.99)*

$$- 0.012TRCEX - 0.032PWREX + 0.245ARDEX \quad R^2 = 0.675$$

(- 0.51)
(- 1.39)
(1.75)*

$$(3) EMPT = 0.172ZGDP + 0.152EDUEX - 0.053HLTEX - 0.216TRCEX$$

(2.02)*
(0.66)
(- 0.78)
(- 0.25)

$$- 0.104PWREX + 0.234ARDEX \quad R^2 = 0.315$$

(- 0.62)
(3.05)*

$$(4) WAGES = 0.088ZGDP + 0.133EDUEX + 0.023HLTEX - 0.068TRCEX$$

(1.96)*
(1.06)
(1.79)
(- 0.63)

$$- 0.045PWREX - 0.216ARDEX \quad R^2 = 0.219$$

(-1.12)
(-0.32)

Note: Figures in parentheses are reported t-statistic and an asterisk indicates coefficients are statistically significant at 10 percent level.

7. CONCLUSION AND POLICY RECOMMENDATION

This study was undertaken to see if there is a relation between public expenditure and poverty reduction. This study concludes that there is link between these two and the channels through which public expenditures reduce poverty is through fostering economic growth, generating employment and raising national wages.

Using national level data from 1995 – 2006, this study found that most government expenditures such as those on agriculture and rural development, education and health are directly pro – poor as they help to reduce national poverty. Other expenditures such as those on power and transport and communication are important for building national infrastructure and industrial growth, but are not pro – poor since no evidence was found according to our model that they have implications for poverty reduction.

Based on the estimation of the simultaneous equation model that this study developed, poverty reduction elasticities of different public expenditures were calculated. It was found that, among all categories of public development expenditures, agriculture and rural development has the highest elasticity of poverty reduction, followed by health and education.

Though considerable share of annual development (ADP) expenditure has been allocated towards rural development, the share of agriculture and that of health have been lower than those of similar economies in South Asia and Southeast Asia. With the millennium objective to reduce poverty by half by 2015, this paper recommends to shift some resources away from not so pro poor sectors (for example power and transport) to these priority sectors so that poverty reduction gets higher momentum. This is a “win-win” strategy inasmuch as public spending on agriculture and health reduces poverty and generate long run growth which makes way for more resources in future.

This study has some limitations. Firstly, this is a time series study but time series data on employment and poverty are not available hence data on these two variables had to be interpolated. This resulted in low or weak significance of the estimated coefficients on the regressors in model and the estimated coefficients of some important variables turned out insignificant or with a wrong sign or both. Secondly data on disaggregate level of government expenditure is only available from 1995 – 96 which is a bit lower for a proper time series study. One way to overcome this problem would be to take a cross section of disaggregated expenditure data for all the districts for the years when LFS took place. This would make the results of the model more robust with high significance.

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APPENDIX:

Table 1

Population

	1970-75	1980-85	1994-00	2002
Total population, mid, -year (millions)	75.6	97.1	131.1	135.7
Growth rate (percent, annual average fro period)	2.6	2.6	1.7	1.7
Urban population (percent of total population)	9.8	17.0	24.5	26.1
Total fertility rate (births per woman)	6.6	5.3	3.1	3.0

Table 2

Net Primary School Enrolment Rate (% of age group)

	1970-75	1980-85	1994-00	2002
Total	50	56	104	-
Male	66	65	106	-
Female	33	47	102	-

Table 3

Immunization Rate (% under 12 months)

	1970-75	1980-85	1994-00	2002
Measles	-	1	71	-
DPT	-	2	72	-
Children	-	68	61	-

Table 4

Life Expectancy at Birth (years)

	1970-75	1980-85	1994-00	2002	2005
Total	46	52	61	62	64
Male	47	52	61	62	-
Female	45	51	61	62	-

Table 5

Mortality

	1970-75	1980-85	1994-00	2005
Infant (per, 1000 life births)	138	114	66	54
Under 5 (per 1,000 Life births)	238	173	83	-

Table 6**Adult Mortality (15-59)**

	1970-75	1980-85	1994-00	2002
Male (per 1,000 life birth)	473	383	278	-
Under 5 (per 1,000 Population)	486	388	272	-
Maternal (per 100,000 life births)	-	-	600	-

Table 7**Real Economic Growth: 1951-2004**

Period (Annual Average)	Economic Growth (Per cent)	Year	Economic Growth (Per cent)
1951-1955	2.8	1999	5.2
1956-1960	2.1	2000	6.0
1961-1965	5.0	2001	5.3
1966-1970	3.6	2002	4.4
1971-1975	-8.6	2003	5.3
1976-1980	5.2	2004	6.3
1981-1985	3.8	2005	6.0
1986-1990	4.2	2006	6.7
1991-1995	4.2		
1996-2000	5.6		
1999-2003	5.4		

Table 8**Sectoral Shares of Output: 1973-2002
(Per cent of GDP at constant prices)**

Agriculture	49.8	43.9	38.3	24.0	18.5
Industry	9.0	11.2	9.9		
Manufacturing				12.5	15.1
Construction	4.6	4.1	6.0	5.5	8.0
Transport, Storage and Communication	10.5	10.8	11.9	8.9	9.8
Trade Services	7.4	9.8	9.0	12.0	13.1
Others	18.7	20.2	24.9	37.0	35.5

Table 9**Types of Employment and its Distribution by Economic Activity: 1991-2000**

	1991	1996	2000
Total Labor Force (millions)	51.0	56.0	58.0
Types of Employment (per cent)	100.0	100.0	100.0
Formal	11.7	12.4	13.1
Non-formal	87.9	87.6	86.9
Family-based	47.2	40.1	37.0
Daily basis	13.9	17.9	17.6
Self-employed	26.8	29.6	32.3
Employment by Activity (percent)	100.0	100.0	100.0
Agriculture, forest, fisheries	66.4	63.2	62.5
Mining and quarrying	-	-	0.7
Manufacturing	11.8	7.5	7.4
Electricity, gas and water	0.1	0.2	0.2
Construction	1.0	1.8	2.1
Trade services	8.5	11.2	12.0
Transports and communication	3.2	4.2	4.6
Finance and business service	0.6	0.4	0.5
community and personal service	3.8	9.3	10.0
Others	4.5	2.2	0.0

Table 10**Poverty, Hardcore Poverty and Income Inequality: 1984-2005**

Type of Poverty	1983-84	1985-86	1988-89	1991-92	1995-96	2000
Poor	62.6	55.7	47.8	47.5	47.5	44.3
National						
Rural	61.9	54.7	47.8	47.8	47.1	42.3
Urban	67.7	62.6	47.6	46.7	49.7	52.5
Hardcore	36.8	26.9	28.4	28.0	25.1	20.0
National						
Poor	36.7	26.3	28.6	28.3	24.6	18.7
Rural						
Urban	37.4	30.7	26.4	26.3	27.3	25.0
Human	1981-83			1993-94	1995-97	1998-00
Human						
Poverty						
Poverty						
Index	61.3			47.2	41.6	34.8

Table 11: Public Expenditure

Particulars	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
Public Expenditure (a+b+c)	23165	24082	25859	29779	34464	37399	40757	42075	47184	53903	64383
expend-development expend expenditure	11712	12305	14232	16562	18195	20536	22700	25307	28390	33324	37333
(b) Development expenditure (ADP)'	9866	10886	10867	12325	15221	15901	15050	15271	16817	18771	24500
(c) Other expenditure ²	1597	891	760	892	1048	962	3008	1497	1977	1808	2550
As percentage of Gross Domestic Products (GDP)											
Public Expenditure as percent of GDP (a+b+c)	13.93	13.33	12.92	13.55	14.54	14.75	14.92	14.00	14.17	15.01	15.47
(a) Non-development expenditure	7.04	6.81	7.11	7.54	7.67	8.10	8.31	8.42	8.53	8.99	8.97
(b) Development expenditure	5.93	6.02	5.43	5.61	6.42	6.27	5.51	5.08	5.05	5.53	5.89
(c) Other expenditure	0.95	0.49	0.38	0.41	0.44	0.38	1.10	0.50	0.59	0.49	0.61

Table 12: Implementation of Annual Development Programme (ADP)

(In crore Taka)

Year	Original Allocation	Revised Allocation	Actual Expenditure	Expenditure as % of Revised Allocation
1991-92	7500	7150	6024	84.3
1992-93	8650	8121	6550	80.7
1993-94	9750	9600	8983	93.6
1994-95	11000	11150	10303	92.4
1995 -96	12100	10447	10016	96.0
1996-97	12500	11700	11041	94.0
1997-98	12800	12200	11037	90.5
1998-99	13600	14000	12509	89.4
1999-00	15500	16500	15471	93.8
2000-01	17500	18200	16240	89.2
2001-02	19000	16000	14090	88.1
2002-03	19200	17100	15434	90.0
2003-04	20300	19000	16817	89.0
2004-05	22000	20500	18771	91.6
2005-06	24500	21500	19472	91.0

Table 13: ADP Expenditure and its Composition by Major Sectors (%)

Sector	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
Agriculture	4.5	5.0	4.5	4.9	4.7	4.5	4.4	3.74	4.04	3.62	4.91
Rural Development	6.8	8.4	8.2	10.1	12.2	12.2	11.1	10.09	13-83	14.27	19.07
Water Resources	5.6	8.2	8.1	7.0	6.9	6.1	5.4	4.29	4.04	2.44	2.64
Industries	1.5	1.4	0.8	0.8	1.7	3.3	1.9	1.14	2.74	2.42	1.66
Power	13.7	13.5	10.9	12.0	12.9	12.2	12.1	13.70	17.26	20.74	18.08
Gas, oil & natura. resource	4.1	4.4	4.9	4.7	4.3	2.5	3.1	4.00	5A9	6.04	1.67
Transport	20.1	22.4	19.7	17.9	17.4	20.4	19.9	16.15	18.04	12.27	15.21
Communication	2.9	1.9	1.6	2.8	3.1	2.8	6.1	3.63	2.23	2.93	3.94
Physical planning & housing	4.6	5.4	5.1	5.4	7.0	7.5	6.6	5.61	5.91	6.03	6.29
Education & religion	13.0	13.2	12.9	13.5	12.8	13.3	14.2	13.88	12.28	13.70	14.49
Health & populatio	6.9	7.9	9.1	8.2	8.1	7.3	7.9	6.72	8.27	8.17	5.12
Other	16.4	8.1	14.1	12.8	9.1	7.8	7.4	17.00	6.24	7.38	6.94
Total ADP	100	100	100	100	100	100	100	100	100.0	100.0	100.0

Table 14: Budget Deficit

	1994-95	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
- Deficit/ financing												
Overall budget deficit (excluding foreign grants)	-4.6	-4.7	-3.7	-3.4	-4.6	-6.1	-5.1	-4.7	-4.2*	-4.2	-4.5*	-4.5
Overall budget deficit (including foreign financing)	2.2	-3.0	-2.0	-2.1	-3.2	-4.5	-4.1	-3.7	-3.4	-3.4	-3.7	-3.7
Net foreign financing	3.8	2.8	2.8	2.3	2.5	2.5	2.0	2.1	2.3	2.4	2.4	2.4
Net domestic financing	1.2	1.8	1.5	1.6	1.9	2.8	2.8	2.7	1.3	2.2	1.8	2.2

Table 15: Quantum of Domestic Resources (according to revised budget) in Financing

	1994-96	1995-96	1996-97	1997-98	1998-99	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
Focal Financing	11150	10447	11700	12200	14000	16500	18200	16000	17100	19000	20500	21500
Foreign Financing	6352	6033	5975	6679	8188	8274	8670	8215	8241	9410	10430	10700
Domestic Financing	4798	4414	5725	5521	5812	8226	9530	7785	8859	9590	10070	10800
Domestic financing as % of Total ADP allocation	43.03	42.25	48.93	45.25	41.51	49.85	52.36	48.66	51.81	50.47	49.12	50.23

