

**AN ANALYSIS OF THE LINK BETWEEN EDUCATION AND THE FIRST
DEMOGRAPHIC DIVIDEND OF BANGLADESH**

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ACRONYMS

BBS	Bangladesh Bureau of Statistics
ESR	Economic Support Ratio
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
HIES	Household Income Expenditure Survey
LFS	Labor Force Survey
LCD	Life Cycle Deficit
NTA	National Transfer Accounts
RMG	Ready Made Garments
SSP	Shared Socioeconomic Pathways
WICD	Wittgenstein Centre for Demography and Human Capital

Abstract

The study attempts to examine the role of education in Bangladesh in the first demographic dividend, which is characterized by a youth bulge. The study contributes a novel argument to the literature on the estimation of the demographic dividend; the National Transfer Accounts (NTA) methodology (2013), which is applied to a more *disaggregated* dataset, can characterize a population more meaningfully compared with a conventional practice. The findings of the paper shed light on the debate on the sources of the first demographic dividend—whether this dividend comes from a pure age structure factor or represents an education dividend. Our study uses a methodology that is similar to the NTA methodology and applies the Das Gupta (1993) method to decompose the dividend into an education effect and an age effect. When the economic profiles are further disaggregated by levels of education, the Economic Support Ratio (ESR) decreases and becomes more representative. The major results include the facts that the size of the dividend is lower and driven by an age effect, with a finding of a negative education effect in Bangladesh for the past decades.

Keywords: First Demographic Dividend; Economic Support Ratio; Das Gupta Decomposition; NTA methodology; Education Effect; Age Effect

Chapter 1: Introduction

Viewed as a window of opportunity offered by the change in the age structure of a population, to boost economic growth, the demographic dividend results from the increasing share of working age population to total population. This phenomenon is referred to as the “First Demographic Dividend.” The same window of opportunity is assumed to be closed after a few decades, with the introduction of a “second” dividend resulting from the potential savings accumulated by the wage earners, assuming no further counter-shock in the age structure occurs within the period between the first and second dividend. The idea behind relating economic prosperity measured by the growth of per capita real output with the change in age structure is due to the opportunities offered by the fall of the dependency ratio. If the ratio of the population of the ages below 15 and above 64 years are comparatively lower than that of the economically and potentially active population of the ages 15-64 years in a country, the country will prosper more. These opportunities can be explained in this way: the country has fewer faces to feed than the number of “wage earners”, thus yielding a nationwide surplus. The term “demographic transition” is a discourse of demography but has impacts on the economic sphere of a country. As a result, economists have attempted to explain whether and how this gift, mostly related to demographic transition, can be realized. This regime of the demographic dividend demands special attention and policy assistance from the policymakers.

The increase in the proportion of the youth bulge can have beneficial effects on an economy because of several considerations. First, there may be an increase in the labour force participation rate, and if the labour market has the desired flexibility—*ceteris paribus*—the number of employed workers will increase. This channel speeds up an economy on the road to economic growth. Second, it is possible that the number of dependent members within an average

household will fall and that the household will have the opportunity to reallocate its assets. Household savings can be increased substantially. Third, the country that experiences this “demographic gift” will have the opportunity to reallocate its resources. The share of expenditures for economically dependent citizens will be reduced. There is an opportunity to reduce the budget deficit and/or to allocate these released resources/funds towards productive functions. Last, if the correct policies are implemented and an effective and efficient investment is made to convert the youth bulge to human capital, the country’s factor productivity will increase: this will further contribute to economic growth. Thus, efficient investment in the education sector in a country—with a youth bulge—should have a growth effect on the economy.

The concept of the demographic dividend has introduced a new dimension into the debate on the economic effect of population growth. There are three tenets of this debate—one tenet claims that population growth has a positive economic growth effect; another tenet is totally opposite to this claim; and the other, namely, the population neutralist tenet, takes a middle of the road position, claiming that the population growth has no significant effect on the per capita output growth. Bloom and Williamson (1998) are among the pioneers of the debate on the relationship between age structure change and economic growth. This later debate deals with a portion of the population that can make a direct contribution to the production of an economy. Two broad distinct tenets are found in the later debate—one on the side of a direct relationship between the dependency ratio and economic growth and the other viewing the relationship as an indirect one, through impacts on human capital, education or productivity. The second debate is inherently related to the first debate. As a part and a variant of the old debate on the effect of population growth on the economy, Bloom and Freeman (1986) investigated the effects of rapid population

growth on the labour supply and employment via the lens of fertility rates and mortality rates. Coale et. al. (1958) studied the growth history and the story of convergence in relation to fertility rates and mortality rates: they found that the population growth rate, in general, has had a negative effect on the achievement of economic growth. Countries with higher population growth rates are trapped in a low-income equilibrium, while the fertility decline has led to higher economic growth, although with a larger population base. Later, Bloom and Williamson (1998) found a strong and significant effect of demographic transition both on the growth of per capita output and on the growth of growth-stimulating indicators—savings and investment. With respect to a purely demographic contribution to per capita output growth, they estimated a 0.4 percentage point contribution to Asia's per capita output growth and a 0.6 percentage point one to East-Asia's output growth.

The investigation into this concept took a new direction. Becker and Lewis (1973), counting the benefit of low fertility, using a microeconomic household utility framework, showed a trade-off between the quantity and the quality of children reared by parents. He also argued that there is a trade-off between the cost of having an additional child and the income of the mother. Lee and Masson (2009) showed that low fertility leads to investment in human capital and hence to human capital accumulation, which has a positive effect on growth. Cuaresma et. al. (2013) investigated whether the demographic dividend is an "Education Dividend", by disentangling the productivity effect—which captures the effect of education—and the translation effect—which captures the pure demographic effect, using a panel GMM estimation technique within a production function approach. Estimating the demographic dividend using just a regression approach is questionable if a study is unable to argue that the results are robust. It is not practical to use a regression method to decompose the change of a rate or ratio into contributing factors

(Das Gupta, 1993). In addition to this, regression-based decomposition methods (Oaxaca, 1974) are not suitable for application to cross-classified data, which becomes more difficult to decompose when the factors are not expressed directly as variables(s) in the formula of the rate or ratio. Renteria et. al. (2016) used a non-parametric approach and further modified an ESR series with education data incorporating the income and consumption profiles over different age groups and levels of education. They decomposed the ESR into two effects—the education effect and the age effect—to show how much of the demographic dividend is achieved through educational attainment, for two economies—Spain, a developed economy, and Mexico, a developing economy. We find two statistical tools to implement the decomposition method mentioned: one is a Stata program (Li, 2017), and the other program is a computer program developed only for the purpose of the Das Gupta and Kigtagawa decomposition methods for cross-classified data (Wang et. al., 2000).

Our study followed a similar methodology used by Renteria et. al. (2016), for a Bangladesh case. We find that Bangladesh experienced a negative education effect and a positive age effect during the observed phase of the demographic dividend. However, the future of the first demographic dividend in Bangladesh lies in education since the age effect slows down and eventually becomes negative.

Chapter 2: Background

Bangladesh has experienced dramatic success in its population control policy. The fertility rate has fallen down from 6.9 in 1972 to 2.1 in 2016. Despite this immense success in population control, the country has demonstrated a fragile capacity to manage its human resources. The age structure has an implied importance on the growth of an economy through the skills and productivity embodied in the labour force. Bangladesh is experiencing an increase in its labour

supply; the question is how capable is Bangladesh of accommodating and mainstreaming this labour supply into its labour market and how might these integrative policies affect the demand for labour and factor productivity growth. Khondoker and Rahman (2017) projected that the first demographic dividend will cease within the period 2030-2045: the timeline depends on different assumptions on fertility growth. Within this timeframe, employment friendly policy measures should be taken, and special attention should be devoted to developing the right policy.

This study examines whether a higher enrolment rate is an appropriate policy indicator of the dividend benefit's realization. Vocational education has not significantly evolved over time. In Bangladesh, the employment to population ratio was stagnant at 60% over the period 2009-2016 and was lower compared to earlier periods. According to a BBS Labour Force Survey (2013), the unemployment rate among the labourers with post-secondary education was 9% (this rate is even higher in the LFS-2010), whereas it was approximately 2% among the labourers with no formal education. Industrialization might have taken place because of the supply of cheap labour: it is cheap either because of its lower productivity or its larger supply in the market. The growth of Bangladesh has been mainly driven by semi-educated and low skilled labour. Agriculture has played a decreasing but significant role in the GDP. The ready-made garments (RMG) industry has a dominant role in the industrial production of the country. While the RMG industry employs approximately 8.4% of the total labour force, the skill gap is second highest in the RMG (BIDS, 2017) industry and highest in the agro-food production industry. The World Bank (2013) argues that given the recent pattern of economic growth (that is, competition on the basis of low cost, driven primarily by low-skilled, low-wage, labour-intensive employment rather than by higher productivity of the labour force), it is also possible that Bangladesh might get stuck in a low-wage, low productivity trap. The report additionally claims that although the country has thrived

in providing greater educational entrée to its population, the level of learning is low and unequal. Within this picture of demography and the labour market, it is a bold but tenuous assumption that the country will achieve the full benefit of the demographic dividend at full length and that the education of the labour force has helped in productivity gains. The benefit to per capita output growth from the growth of the working age population will be as a result of the age effect.

There are two papers that are dedicated to the demographic dividend in Bangladesh: Chowdhury (2014) and Khondoker & Rahman (2017). Chowdhury (2014) analysed the age structure of the population of Bangladesh and showed that the working age population is sharply rising. He prescribed some policies to grasp the economic benefit of this demographic change. Among the existing literature on Bangladesh's demographic dividend, Khondoker & Rahman (2017) extensively and rigorously investigated the possible deadline of the first demographic dividend and the possible policies for obtaining benefits from this demographic dividend. In explaining the demographic dividend, the previous works did not include education as an endogenous factor and hence could not measure the effects of education on the demographic dividend. The existing literature is also unable to present evidence-based conclusions on whether Bangladesh's demographic dividend is dominated by an age component. The contribution of this paper will be the decomposition of the effects of education and age on the demographic dividend, treating education as an endogenous factor and, more specifically, evaluating the contribution of the education sector in capturing this dividend's economic benefits.

Chapter 3: Methodology

National Transfer Accounts (NTA) attempted to measure the trend of the demographic dividend, using the support ratio (NTA, 2013). This paper uses the Economic Support Ratio (ESR) to measure and analyse the demographic dividend. To elucidate the meaning of ESR, NTA starts

with a macroeconomic identity from which it derives the expression for ESR. This section portrays both the rationalization and the development of the ESR and discusses how it can be decomposed into the education effect and the age effect.

The income per capita can be written as

$$\frac{Y(t)}{N(t)} = \frac{W(t)}{N(t)} * \frac{Y(t)}{W(t)} \quad (1)$$

$$y(t) = w(t) * \hat{y}(t) \quad (2)$$

where Y is the total income, N is the total population size and W is the size of the working population. $w(t)$ is the share of the working age population in the total population and is also defined as the support ratio. \hat{y} can be defined as the output per labourer if the labour force participation rate is close to 1.

$$g(y) = g(\text{SR}) + g(\hat{y}) \quad (3)$$

Therefore, per capita income growth is equal to the sum of two growths—the growth in the support ratio and the growth in output per labourer. The growth of the support ratio has been termed the “translation effect”, and the growth in the income of labourers is due to the “productivity effect.” However, a modified version of the support ratio, the ESR, is used in this paper. The ESR embodies both the per capita age profile of income and consumption and instead of using the number of total labourers and population data, uses the effective number of labourers and the effective number of consumers to calculate the ratio. This replacement of labourers and population data by the effective number of labourers and the effective number of consumers helps to incorporate relevant economic profiles into the analysis of a purely demographic context.

A series of effective labourers and effective consumers are defined in the National Transfer Accounts (NTA) as

$$\hat{L}(t) = \sum_i N_i(t) * l_i \quad (4)$$

$$\hat{C}(t) = \sum_i N_i(t) * c_i \quad (5)$$

The summation is over different age groups: l_i and c_i are ratios of the per capita age profiles of the labour income and consumption to the per capita age profiles of the labour income and consumption of the population between 30-49 years of age, respectively., measured at a fixed year. Renteria et. al. (2014) further modified the equation (4) and (5) with the information on levels of education.

$$\hat{L}(t) = \sum_j \tilde{L}_j(t) = \sum_i \sum_j N_{ij}(t) * l_{ij} \quad (6)$$

$$\hat{C}(t) = \sum_j \tilde{C}_j(t) = \sum_i \sum_j N_{ij}(t) * c_{ij} \quad (7)$$

The paper argues that the number of effective labour resulting from the formula of cross-classified labour income profiles differs from the labour income profile only classified by age groups. Age and education-level specific population size and the per capita labour income are both considered as a weight to each other. If it is found that the per capita labour income of an education group is low while the population size of the group is high, the group will yield a lower number of effective labour. On the other hand, if a single profile for all five education groups is used to estimate the number of effective labour, the difference between these two methods might be high. Technically, the same argument holds for the number of effective consumers. This paper argues that cross-classified and representative data can estimate economic support ratios more accurately than a less disaggregated dataset can. Since labour income within

an age group can be different between two education groups, a single profile for all education groups can lead to an unjustified smoothing of the economic profiles, yielding a biased result. To make them concise, the estimates of equation (4) and equation (6) should differ from each other since an average labour between 30-34 years of age differs from a labourer of the same age group but that has a post-secondary education qualification.

The ESR can be defined as the ratio of the effective labours to the effective consumers.

$$ESR(t) = \frac{\hat{l}(t)}{\hat{c}(t)} \quad (8)$$

The second summation over index j is the summation over levels of education. We will use the ratio of equation (6) and (7) as the ESR that contains the information on the education level of the population. After estimating the ESR (with projections), the paper will proceed to decompose the change of the ESR between two consecutive periods, following Gupta's (1993) method. Gupta's method, which is a refined version of Kigtagawa (1995), is widely used in demography to find the effects of contributing factors on a rate: each factor's effect is estimated while keeping other factors constant. This paper will use his method for decomposing the ESR for cross-classified data (Chapter-5). The decomposition will estimate the effect of age and education separately for each period. The population composition captures the main parts of the effects.

$$\begin{aligned} \frac{N_{ij}(t)}{N(t)} &= \underbrace{\left(\frac{N_{ij}(t)}{N_j(t)} * \frac{N_i(t)}{N(t)} \right)^{0.5}}_{= a_{ij}(t)} \underbrace{\left(\frac{N_{ij}(t)}{N_i(t)} * \frac{N_j(t)}{N(t)} \right)^{0.5}}_{= e_{ij}(t)} \quad (9) \\ &= a_{ij}(t) \quad = e_{ij}(t) \end{aligned}$$

a_{ij} and e_{ij} capture the variation in the composition of population due to age structure and years of education, respectively, over time.

$$A(t) = \sum_i \sum_j \frac{esr_{ij}(t) + esr_{ij}(t-1)}{2} \cdot \frac{e_{ij}(t) + e_{ij}(t-1)}{2} \cdot a_{ij}(t) \quad (10)$$

$$E(t) = \sum_i \sum_j \frac{esr_{ij}(t) + esr_{ij}(t-1)}{2} \cdot \frac{a_{ij}(t) + a_{ij}(t-1)}{2} \cdot e_{ij}(t) \quad (11)$$

$A(t)$ corresponds to the rate and age standardization of the age effect at time t , $E(t)$ corresponds to rate and education standardization of the education effect, and $esr(t)$ stands for the growth in the ESR at period t .

Now, the effects are defined as following:

$$\text{Age effect} = A(t) - A(t-1) \quad (12)$$

$$\text{Education effect} = E(t) - E(t-1) \quad (13)$$

As a change in the ESR between two consecutive periods, t and $(t+1)$, is seen as the first demographic dividend at the $(t+1)$ th period, equation nos. 12 and 13 measure the contribution of age characteristics and education characteristics to the change. Hence, the two equations provide us the age effect and the education effect.

3.1. How could the estimates of ESR represent the population characteristics better than NTA estimates?

We argue that the estimates from NTA studies do not necessarily measure the ESRs on a better representation basis. The reason is that it has been observed that many of the countries have larger variations in their per capita income data. It is theoretically obvious that one of the sources of the variation is the level of education that a population has. Since the level of education is an important indicator when we measure the labour market return (labour income), it is necessary to disaggregate the income data by the level of education. The estimation of the number of effective labour uses the ratio of labour income (in relation to labour income of the 30-49 age group) and

population data. Therefore, the variation in the effective labour definition comes from these two variables. Note that the population data are also required to be disaggregated by the levels of education since the ratio of labour income is treated as a weight to estimate the number of effective labour. If the population data is not disaggregated by levels of education, it is likely that a larger population with no education would be weighted by a larger weight, although it deserves a smaller weight. Since the level of education is an important determinant of a labour income and the population of Bangladesh can be characterized as having a lower educational level, both the data on population and economic profiles are required to be disaggregated from the available information on education.

This type of argument would also be applicable globally for other countries. The countries having labour market characteristics and educational levels of the population similar to those of Bangladesh should disaggregate the population and economic profiles both by age groups and by the levels of education. Since the numbers of effective labourers and consumers are weighted by economic information and that information includes information on educational attainment, this type of disaggregation can provide more representative estimates of the ESR for the countries around the world.

The theories of consumption smoothing assert that people smooth their consumption over their life cycle. This theory indicates that consumption smoothing leads to little variation in consumption data. Since the ratio of per capita consumption (expressed in terms of the per capita consumption of the 30-49 age group) is used as a weight for the population, to measure the number of effective consumers, the consumption data can be disaggregated by age groups and

levels of education. However, the expectation is that there will be less variation in the consumption due to changes of age groups and more variations due to changes of educational levels; this variation mostly comes through the channel of income. The overall variation in consumption should be lower than the variation in labourer income since we do not expect that there is any type of smoothing in labourer income. These hypotheses indicate that the demographic dividend is primarily driven to a larger extent by the labourer's income profile than by the consumption profile.

3.2. Data

Two types of data are required for estimating the ESR—population data and data on economic profiles. The population data is collected from the Wittgenstein Centre for Demography and Human Capital (WICD). This study developed age profiles of the per capita labour' income and per capita consumption, taking the NTA dataset developed by the NTA country team. The NTA profiles provided a series of per capita consumption and per capita labour income disaggregated by age groups. However, this study disaggregates the age profiles further by five levels of education and excludes the population below ages 15 since the WICD population data does not assign a level of education to this population age group. Thus, this study includes 14 age groups of five years of age intervals and five education categories, resulting in 70 observations for each of the profiles. Alternatively, each of education groups has 14 observations, under an economic profile. This study suggests that along with the age level, education is a major component in determining the income and consumption profiles. Thus, we find the first demographic dividend of Bangladesh, using the age and education profiles of per capita labour income and per capita consumption, thereby improving the existing literature.

WICD provides data on population that is primarily collected from the United Nations Population Division. WICD makes various projections using data from the Shared Socioeconomic Pathways (SSPs). The SSPs include sex-specific life tables, age-specific fertility rates, age-sex specific immigration and emigration rates and an education profile of a country. This study uses three out of five SSPs and two variants of the most likely pathway (SSP2-medium). The WICD projections have been done following a standard meticulous method (Lutz et. al, 2014). However, the projection includes educational data as a major factor for projection and argues that this helps to develop a better projection. Consistent with the study's requirement, the population data are cross-classified by age groups, on five years intervals, and by levels of education. The WICD classifies the dataset in terms of six educational categories—No Education, Incomplete Primary, Primary, Lower Secondary, Upper Secondary, and Post-secondary. However, it offers an option to have four categories, omitting the “Incomplete Primary” category and merging the two secondary education types to a single category. This study includes five categories, keeping each one of the six categories and merging the two secondary education categories. The following section briefly discusses the SSPs.

Chapter 4: Results

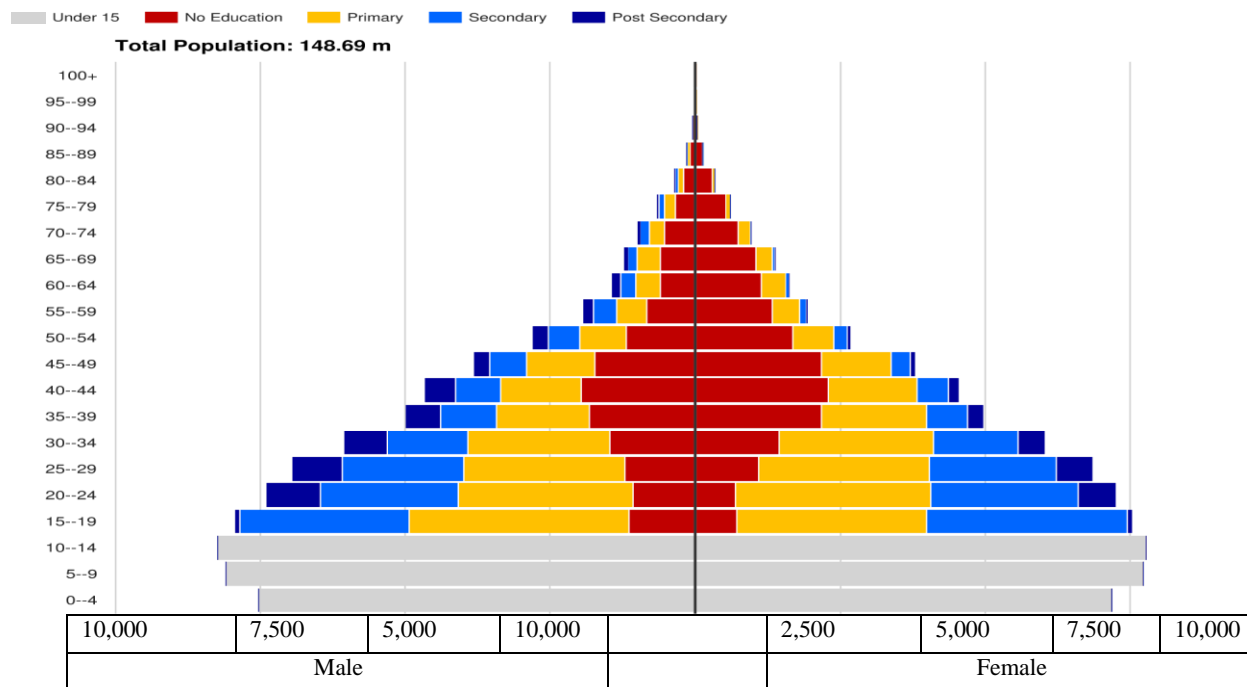
Bangladesh was an ideal representation of the population pyramid hypothesis of the 2000s (not shown in graph). Bangladesh's birth control policies, which decreased the size of the population under age 15, changed the bottom bars of the pyramid: this change is more visible for the population below 10 years of age. Graph-1 represents this population control phenomenon in which the bottom two bars shrank substantially, in 2010.

Although the birth rates fell, the upper bars were unaffected. Thus, the representation still resembles a pyramid if the population group aged 10 years and below is ignored. However, in

2050, the projected distribution of the population will not resemble a pyramid. In 2050, the bars in the ages 15-44 population group are quite similar in length to those in 2010, and the age groups between 5-9 and 10-14 years of age in 2010 will be the age groups between 45-49 and 50-54 years of age. In 2050, the latter two groups will be larger in size compared to all other five years of age interval groups. Figure-1 shows that although the age 40 and above population with no education exhibits a pyramid shape, the population below age 40 does not. This indicates that the distribution of the illiterate population started changing decades ago. However, the population with other types of education resembles a pyramid shape, across the whole distribution.

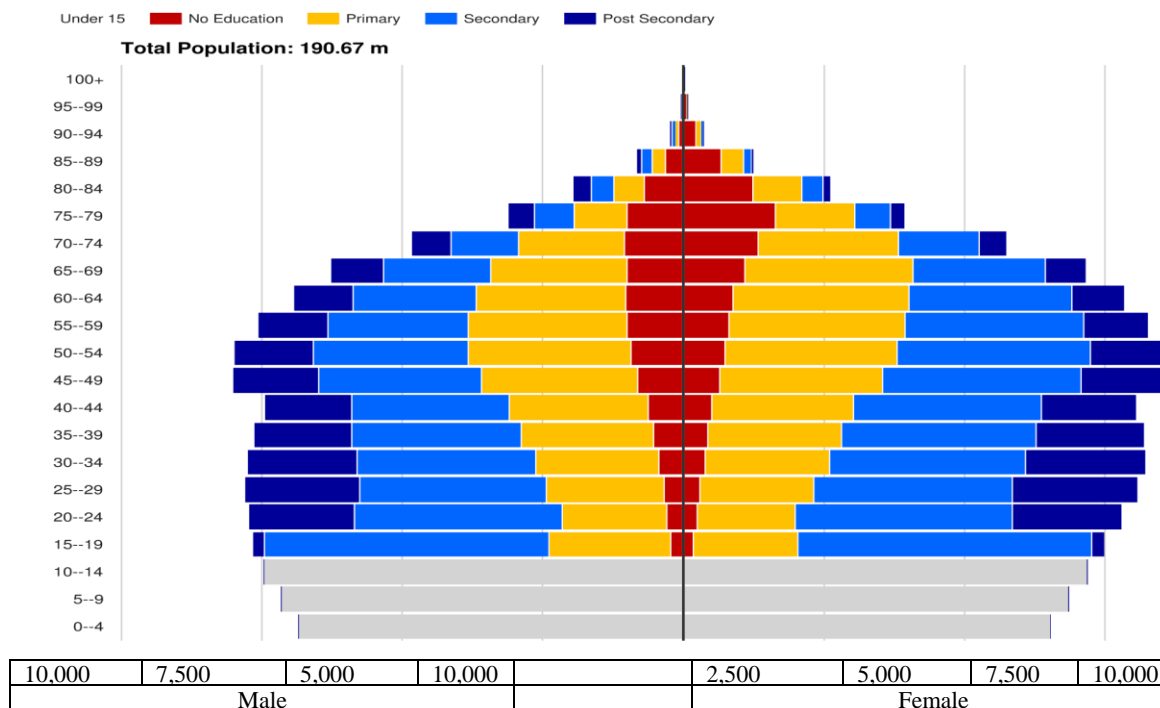
However, the post-secondary education population group below age 20 does not have a larger bar, as many of them are expected to still be in the process of achieving a degree. In recent decades, the country has achieved gender parity in terms of educational attainment, across all categories. In 2050, it is projected that the population with a primary or no education will become squeezed in number, for all the groups aged below 50, as the educational characteristics of the working age population will be changed, and gender parity will be achieved to a greater extent.

Figure 1: Bangladesh Population in 2010



Source: Wittgenstein Centre for Demography and Human Capital (WICD)

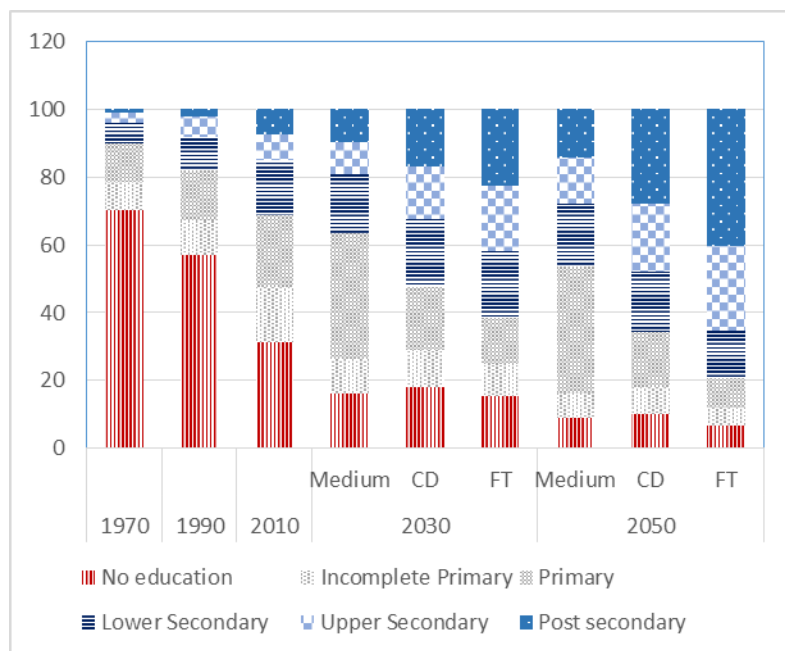
Figure 2: Bangladesh Population in 2050 (projected)



Source: Wittgenstein Centre for Demography and Human Capital (WICD)

It is projected that the age 65+ population will be increased with a little reduction in the population below 15 years of age, indicating that there will not be an overwhelming change in the share of the dependent population.

Figure 3: Distribution of Population



Sources: Author's calculation from WICD data

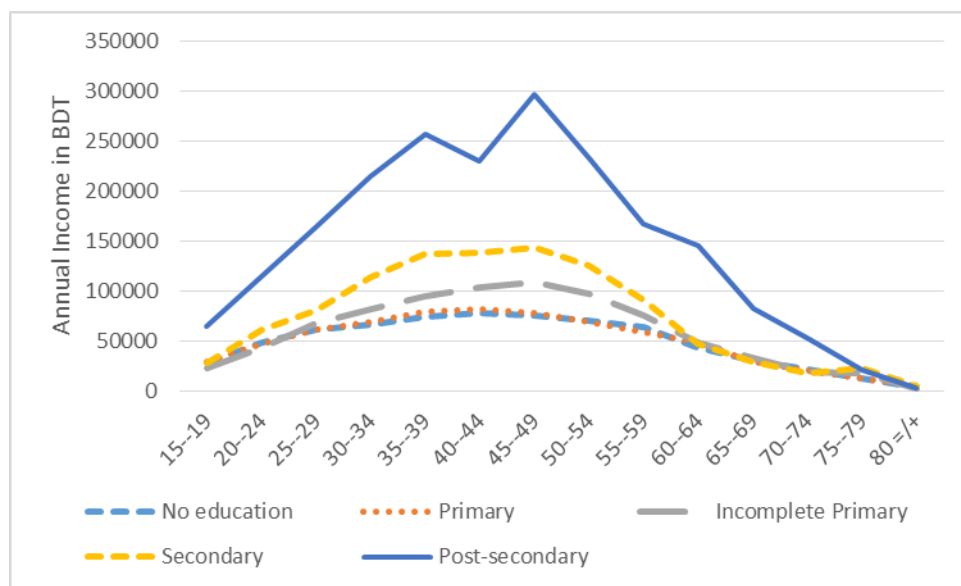
Bangladesh has made considerable progress in terms of educational attainment. Starting from one-third of the population with no institutional education in early 1980s, it has achieved an educational attainment level in which in 2010, one-third of the population had a post-primary education. The population with no education has decreased by 30 percentage points. Since a variable portion of the previous cohorts with a nearly unchanged educational status remains in each period, the distribution of the population in terms of education is affected. However, if the distribution in the short-term becomes more suitable, the educational achievement will be less affected by the country's demographic history. The distribution shows that the country progressed significantly in educational achievement in the 2000s and that the progress continued onward. If the current trends continue, Bangladesh will have 20 percent and 30 percent of the population with secondary and post-secondary certificates/degrees in 2030 and 2050,

respectively (see the bars over SSP2-medium). The population with less than a primary education will fall to 30 percent and 15 percent in 2030 and 2050, respectively. However, two other optimistic projections forecast that more than 50 percent of the population will have above a lower secondary education, keeping the population with a primary or less than primary education at less than 50 percent in both 2030 and 2050. However, this type of achievement in education is too divergent from the SSP2-medium scenario projection and is not consistent with the storyline of Bangladesh.

4.1. Labour Income and Consumption Profiles

Labourer income is an important variable in defining the ESR. If labourer income, disaggregated by age groups, has a favourable profile, *ceteris paribus*, the employed population from the pool of the working age population will be able to support more. Thus, the number of effective labourers increases if the labourer income series moves up. On the other hand, the consumption profile for adults does not vary much in the presence of consumption smoothing.

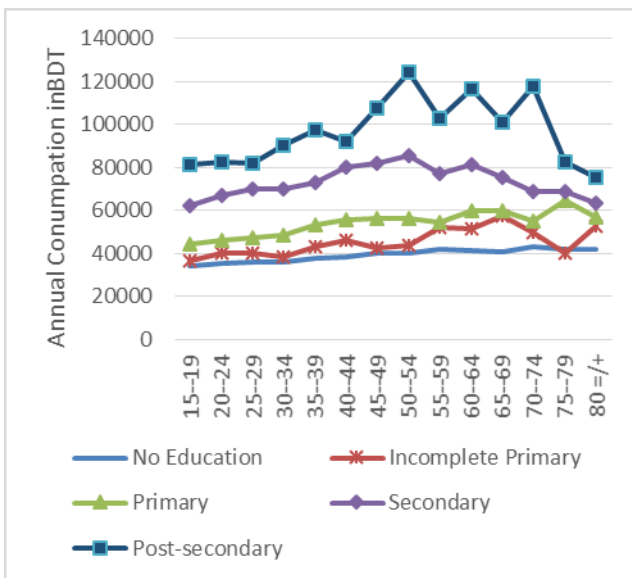
Figure 4: Income Profile



Source: Authors' Calculation

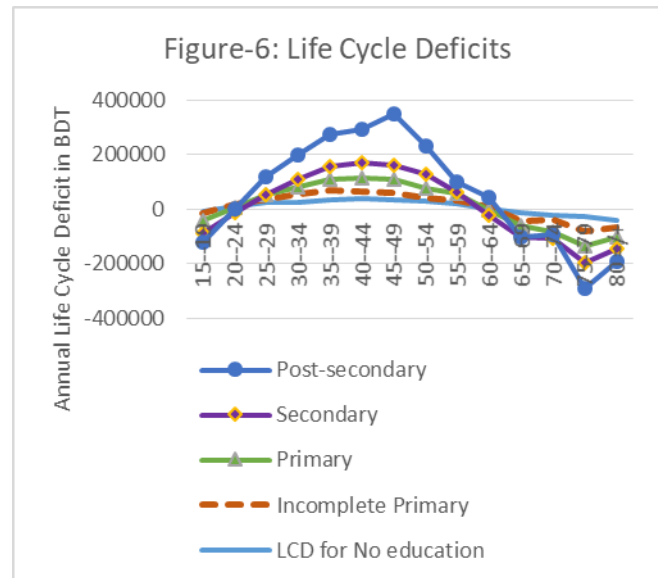
Figure-4 shows that the highest level of per capita annual income across different age groups is observed for the post-secondary level educated population, as expected. The population with no education has the lowest profile of per capita income across age groups. It can be deduced from the figure that the per capita labourer incomes across age groups is positively associated with educational qualification. However, the variation in annual income rises as the level of education increases. These findings indicate that the expected level of annual income earned by a group with a higher educational status will be lower than the level depicted by the simple average figures in the graph. Alternatively, the groups with lower education can expect a labourer income close to the average income. This phenomenon has a broader impact on labour market competition and outcome and will be investigated later in this study. Another important but a normal feature is revealed in the figures that show incomes at the retirement ages falling for all education groups, and that, except for the post-secondary education group, this does not vary largely across education groups. Figure-5 describes the per capita annual consumption across age groups for different education groups. Similar to the income series (see figure-4 & figure-5), consumption

Figure 5: Consumption Profile



Source: Authors' Calculation

Figure 6: Life Cycle Deficits



Source: Authors' Calculation

follows the assumption of life-cycle hypothesis. There is little variation in the consumption series across the education levels, and consumption is not linearly related to income. We find evidence, although non-linear, for consumption smoothing over the life cycle. We can infer from the life-cycle hypothesis of consumption that the reason for this slight variation is that consumption is financed by wealth accumulation over life. The Life Cycle Deficit (LCD) is defined as the difference between income and consumption and can also be analogized with savings.

Figure-6 illustrates the Life Cycle Deficit for the education groups: the groups with post-secondary education reach their peak in terms of life-cycle surplus (savings) at the ages 45-49; the group with incomplete primary education reaches it at the ages 35-39; and the other three groups reach their LCD peak at the ages 40-44. The series of LCD reflects the shapes observed in the income series since there is little variation in the consumption series.

4.2. When the First Demographic Dividend ends in Bangladesh?

This question concerns a projection. We are using four relevant projections for Bangladesh to answer this question. Figure-7 illustrates the timeline when the dividend is projected to reach its peak-point. For both assumptions of conventional development and rapid development, the dividend will reach its maximum around the year 2035. The fast-track enrolment rate under the assumption of the medium scenario could extend this period by five years, while the medium (SSP2) scenario and the constant enrolment rate CER (SSP2) scenario will expedite the timeline by five and ten years, respectively. These findings hint that the fast-track enrolment rate can boost the support ratio and extend the rising part of the ESR curve for another decade. However, we cannot expect an extended period of demographic dividend, as we are only a decade away from the peak of the ratio and an overhauling change is unexpected to happen.

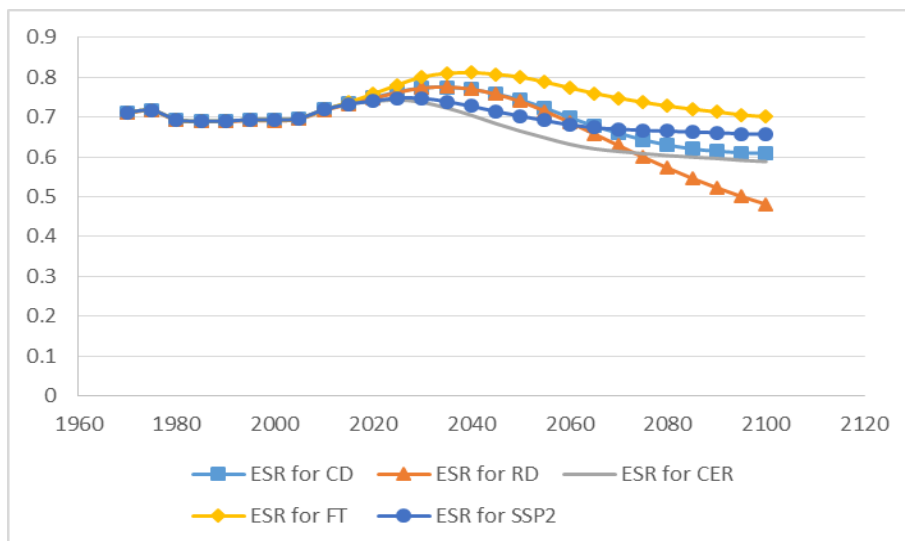
The best-fit assumption for each country in the database is the medium (SSP2) scenario where fertility, mortality, migration, and enrolment all are set at a country-level medium—not having a too optimistic or too pessimistic view. It is assumed in the SSP2 medium scenario that the current trend will prevail for the

next one or two decades. Under the SSP2 (medium) projection, the dividend will reach its maximum value in 2030. However, support ratios vary across the projections

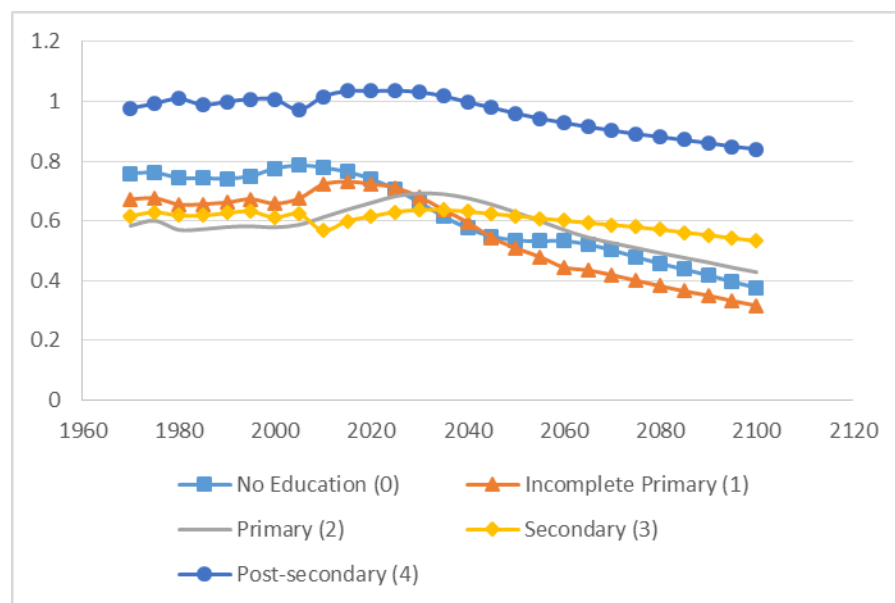
Two important pieces of information can be derived from the time-series graph of educational status-wise ESRs—First, the within-group capacities to support its members and the comparisons of ESRs across the education groups can be derived. It is evident from the graph that the curves of support ratios are placed in a way that does not exhibit a positive role of education. Until 2010, the group with the highest observed ESRs was the group with a post-secondary education. The ordering of the position of the curves for ESRs across other levels of education is inverse to the order of educational attainment: no education, incomplete primary, secondary and primary education groups take position in a consecutive order. This does not provide any positive evidence in favour of the effect of education on support ratios.

Figure A3 in the appendix explains the role of education further in a disaggregated way, based on the data under the assumption of conventional development. Until 2010, the support ratio was the highest for the post-secondary education group and the lowest for the group with primary education group. The group

Figure 7: ESR Profiles by SSP Assumptions



Source: Authors' Calculation

Figure 8: Educational Status-wise ESR: Medium (SSP2)

Source: Authors' Calculation

with no education can support the members within the group at the second highest ratio for the same period. However, the group with secondary education can support the members within its group at a lower rate than that of the incomplete primary education group.

Second, the projection on when the groups will reach the peaks of their respective support ratios can also be derived from the time-series graph of educational status-wise ESRs. From the observed data, we cannot differentiate the contribution of education in terms of support ratios since the behaviour of education-related ESRs is erratic. However, for the future horizon, education will play an important role in the demographic dividend. The peaks of group-wise support ratios are positively associated with the levels of education, in the desired order. Two groups of population at the lower end of the educational attainment spectrum have already crossed the apex point in the series of support ratios—the group with no education reached it in 2005 and the group with an incomplete primary education reached it in 2015. The primary education group is projected to reach its maximum in 2015, while the primary, secondary and post-secondary, educational groups will reach it in 2025, 2030 and 2035, respectively. It is clear that the

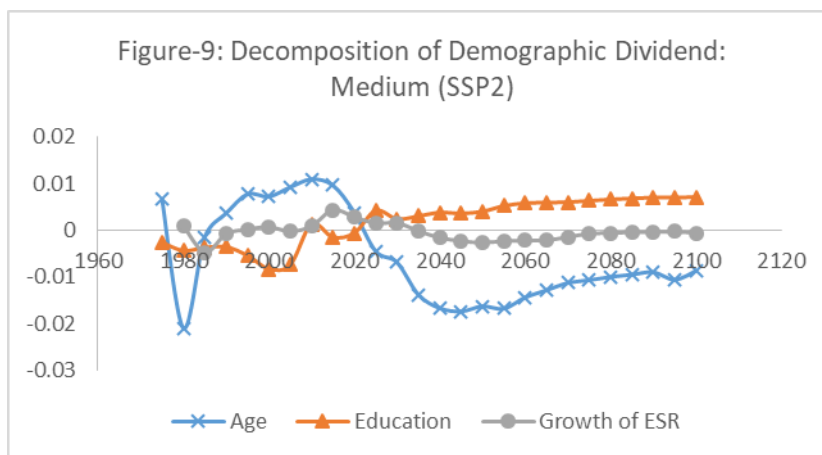
intra-group support ratios meet the peak of the first demographic dividend in an order that is positively related to educational attainment, if the case of the post-secondary group is put aside. The groups at the lower end of the educational spectrum have already reached their optimum support point, and the other three groups exhibit a still-burgeoning support series projection.

Though the first type of information invalidates the role of education in the support ratio because of the erratic pattern across education groups, the second type of information shows that the educational attainment plays a positive role in the support ratio. In a changing scenario over the future horizon, the population with a higher level of education will be able to provide support for a longer period and vice versa. The question remains why the past experience did not provide evidence of the positive role of education.

4.3. Decomposition of the Demographic Dividend: Age Effect and Education Effect

The support ratio alone cannot explain whether the increasing (decreasing) trend is dominated only by the change in the age structure, the change in the knowledge (education) paradigm or by both. Finding source(s) of the demographic dividend in terms of policy suggestions is important. There is a debate whether the demographic dividend is purely an age effect. To address the debate, the study decomposes

Figure 9: Decomposition of Demographic Dividend: Medium (SSP2)



Source: Authors' Calculation

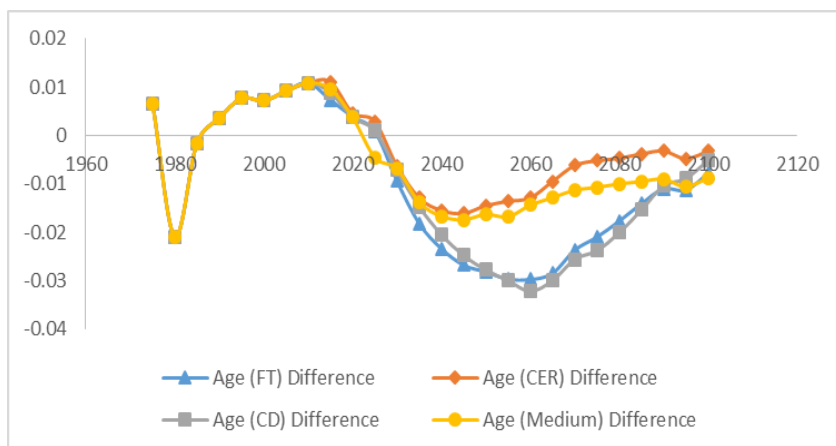
the ESR into two major components: age and education; and a residual component.

Figure-9 graphs three curves—the grey curve shows the change in ESR or the demographic dividend, the blue curve is the curve showing the education effect, and the red curve shows the age effect. Age effects and education effects are found by decomposing the demographic dividend or by the change in the ESR. The sum of the latter two curves will be close to the first curve since there is a residual curve. The demographic dividend prior to 1990 was negative, except for the period 1970. In 1971, a historical event, a war, which affected the working age population, occurred. The series probably contains the aftermath of this event until 1990, but this is not conclusive. The support ratio remained stagnant until 2005 and started growing after 2005. Based on the assumption of conventional development, it will grow until 2040 and reach its apex, at which time the growth in the ESR will be zero. It is projected that 2040 will be followed by a longer period of negative ESR growth.

For the period 1990-2015, the positive growth in the ESR is associated with a positive age effect and a negative education effect, if we skip the period 2010. Therefore, we can argue using this evidence that Bangladesh did not experience a positive effect from education on its demographic dividend and that the dividend was dominated by the pure age component. However, the post-2020 ESR growth (dividend) will be accompanied by the two effects in reverse directions—a positive education effect and a negative age effect. This projection indicates that the future is not as gloomy as the past. What are the pictures of the age effect and the education effect under other projections? Figure-10 and figure-11 answer this question. It can be seen that the age effect will be negative for all four projections. In the CER case, under the assumption of the medium scenario (SSP2), the age effect curve lies above any of other three curves. The curve representing the sustainable development scenario has the least age effect and a medium education effect. The fast-track education case, under a middle-of-the-road scenario, shows the highest education effect, while showing a medium age effect. Under the conventional development assumption, the age effect and the education effect lie in the middle of the other projections. Under the medium SSP scenario, the maintaining of a constant enrolment rate reflects an average age effect closer to the horizontal axis.

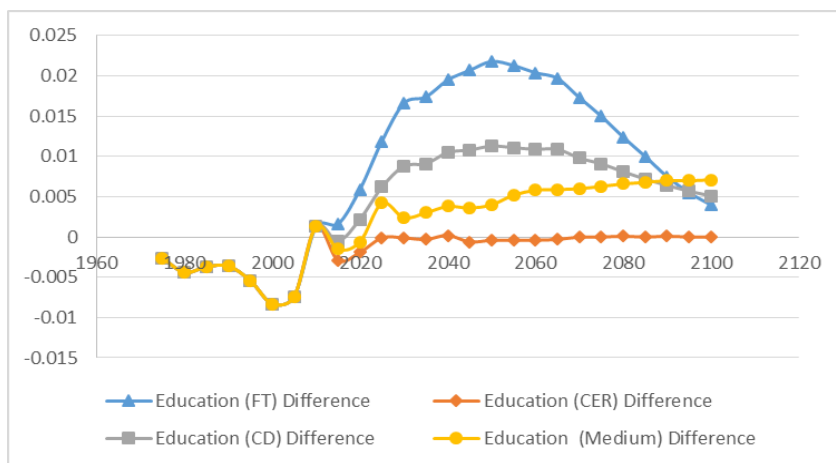
This study suggests the consideration of the medium (SSP2) scenario for Bangladesh and presents the other three scenarios for a comparison showing what the results would be if the country slides down or up in a specific scenario. For a closer assumption to reality, under the medium (SSP2) scenario, the education effect will be positive after 2020 but will not result in an extended period of the demographic dividend compensating for a larger negative age effect.

Figure 10: Age Effects



Source: Authors' Calculation

Figure 11: Education Effects



Source: Authors' Calculation

To make a general comment, the education effects are higher for the Fast Track enrolment scenario. The demographic dividend is also larger for the same SSP2 projection with the Fast Track enrolment (figure-, appendix). However, the age effect and the education effect of the most likely projection (the medium-SSP2 scenario) are closer to the CER scenario and far from the FT scenario. The enrolment rates in the fast-track countries in East and South East Asia are not appropriate as a model for Bangladesh because of the differences in age structures and educational attainment in these countries. It can be argued that Bangladesh will not perform at its best through capturing the education effect.

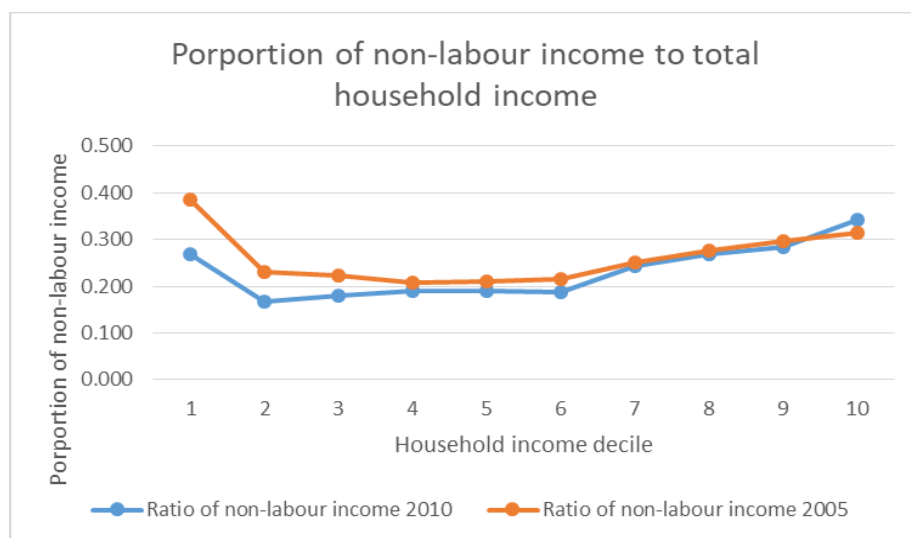
Chapter 5: Discussion

This study finds different sets of support ratios, compared to those in Khandaker & Rahman (2017). One of the findings is that the support ratio from an aggregate measure can vary if the dataset is further cross-classified. Our data is cross-classified by ages and levels of education that differ from many cutting-edge studies on the demographic dividend. There are two reasons for differences in the estimates of the ESR. First, Lutz et. al. (2014) argues that education is an important factor in population projection. Thus, this leads to differences in projected values and brings changes in the support ratio in the future horizon. Second and most importantly, for the aggregate population, the per capita age profiles of the labourers' income and consumption vary from the per capita age profiles estimated from the different population group disaggregated by levels of education. This aspect diminished the values of the ESR for Bangladesh because the population series of Bangladesh is largely dominated by the group with no education or little education. Since the population with lower education achieves low levels of income, the number of effective labourers within those groups decreases. On the other hand, the numbers of effective consumers does not decrease considerably, considering public consumption. The second reason explains why the working age population in Bangladesh can support a smaller number of population members. This study argues that these findings regarding comparative studies may prevail for other countries having a similar population composition, based on the relationship between education and labour market outcomes. Under the SSP2-medium scenario, at the peak point of the ESR curve, the working age population in Bangladesh

can support 75 percent of its population, and the range of the ESR lies in the interval 66%-75%: the current rate is approximately 73%. Who supports the rest of the consumers or the dependent population? An easy answer to this question is that this support comes from non-labour income. Asset income, income from asset liquidations or sales and government's revenue collection are the major sources of non-labour income. Consequently, the government has an important role in mitigating the support deficit.

A similar type of implications applies to the household as to the broader economy. From HIES 2010 (2005), it is observed that about 26 (28) percent of household income comes from assets. The change between the two surveys indicates that share of labor income increased which resembles the series of ESR. This envisages that the number of effective labor per household relative to consumers per household increases, on average, as the country approaches to the pick of the demographic dividend. When we divide the dataset by household income deciles, it is observed that higher income groups have a higher proportion of income which comes from the asset, social safety net etc. However, the proportion household income from non-labor components is not less than 18 percent for any income deciles, indicating the importance of asset income (Figure 12).

Figure 12: Proportion of non-labour income to total household income



Source: Authors' Calculation from LFS 2005 and 2010 rounds

Per capita monthly consumption expenditure is approximately 15,420 BDT (BER, 2017) and the per capita social safety net support is 212 BDT. The ratio of the social safety net support to the consumption expenditure is minimal. The revenue collection is approximately 11 percent of the GDP (BER, 2017), and this rate is the lowest in South Asia. These statistics indicate that Bangladesh has the potential to increase this rate to a regional average, which can further increase the ratio of the social safety net to consumption. This finding implicates that a larger part of the support, approximately 20 percent, neither comes from the labourers' income nor from the social safety net programs of the GoB. The volatility in asset prices and in the asset market can be hazardous for consumers, since a larger part of consumption comes from this market.

Another question raised is whether the population can support more of its consumers? The answer remains dependent on the features of the wage distribution. We are unsure about how we could make the support ratio high enough through wages. This study discusses labourers' income, which, necessarily, comes from the labourer's activities. The support ratio could possibly be increased through wages if the labourer income gap between the active age population, that is, ages between 30-49 years, and the other age groups could be diminished so that the wage ratio would be unity or greater than unity for more age groups. Per capita relative consumption, which includes both public and private consumption, is higher than per capita relative income for nearly every age group, irrespective of education level. This aspect brings forth the issue of productivity and human capital across ages. Though NTA methodology assumes that the population aged between 30-49 years have a higher per capita ratio of income relative to consumption, it does not state how much heterogeneity would be accepted within this 30-49 aged population. It is expected that job market experiences would add value to labour income. Two channels are important to have a favourable alternative labour income profile. First, a country should have a higher proportion of the population in high-income groups. Second, it is important to pull up the income of groups with a higher within-group proportion of the population, as we see from the evidence that higher

income groups have higher per capita income but a smaller within-group population. This evidence suggests that both the channels to improve the labour income profile are not a good fit for the Bangladesh case. The challenge for Bangladesh is to develop a population composition with a high proportion of higher earning groups.

To understand the labour income profile, a closer investigation of the labour market is required. According to a BBS Labour Force Survey (2015-2016), the rate of unemployment is the highest among the group with a tertiary education. This might be a result of producing larger than an optimum number of university graduates. If a group of a population has a higher percentage of unemployed population, the support ratio for the group scales down, reflecting the fact that the group has a higher number of economically dependent population members. The data on income reflects more than 50 percent of the employed population with zero income. These 'labourers with zero wage' come from the unpaid family worker or self-employed groups in the population. The self-employed population add values to a country's economic production and receives sales revenue or profit in return but not in the form of wages. However, unpaid family workers might be unemployed because of having no better option available and, possibly, they are employed as surplus labour. The second group dampens the labour income profiles and lowers the support ratio.

How smoothly Bangladesh is facing these challenges is a subject of investigation. LFS 2009-2010 shows that 20 percent of the ages 15-30 population reports themselves as students. It is expected that the remaining 80 percent should be merged with the labour force. Another alarming statistic is that approximately 30 percent of the ages 25 - 30 population is not either in education or in the labour force. However, about half of ages 15-30 population is out of the labour force. Another labour force survey conducted five years later shows that more than one-third of the population who were in the age interval 15-30 in 2009-2010 is still out of the labour force. If we take a closer look at the young cohort aged between 25 and 30, in the 2009-2010 period, students only represented 4 percent of this group, but 36% of the members of this age group were out of the labour force. In the 2015-2016 period survey, 33 percent

of these youths were still not in the labour force. The improvement during this 5 to 6-year period is not significant. It is visible from the findings that there might have some barriers to entry into the labour force. Traditionally, the female population constitutes most of this “not in the labour force” population. This phenomenon raises the issue of the dependent population within the group of working age population that creates an additional difficulty for the support ratio. The lower female labour force participation rate is a big concern, but it is unlikely that the situation will be improved in the near future. The percentage of the population working in formal sectors is another factor in a lower support ratio. The population working in informal sectors does not have the advantages of pension or provident funds. The concern remains how this group will be supported after their retirement. Traditionally, grown-up children take the responsibility of supporting their parents in their old age. Support for the senior citizens from GoB is limited and insufficient. Thus, the effect of the informal-sector-centric labour market on the support ratio is negative.

Since the first demographic dividend ends by 2025-2035, it will be too optimistic to hope to overcome all these barriers within this short length of time. However, there is still hope and possibilities to make the best out of it.

Chapter 6: Conclusion

The study attempts to decompose and examine the first demographic dividend in Bangladesh. Since the outcomes through education result from the investment in the educational sector, the educational investment should be revisited based on the diagnostic check obtained from the study. The findings from the study are not very optimistic for Bangladesh, while the study maintains the current trends in educational investments. The findings obtained through the mentioned methodology and data are summarized as follows.

1. First, the demographic dividend in Bangladesh ends by the period 2030. This timeline could be extended by five to ten years if the population distribution results in a higher share of educational attainment. This does mean that if the population with lower education could be diminished and

population with higher level of education could be increased, the support ratio will increase and thus the peak of the support ratio would be attained a few years later. Though this is statistically possible, it will be a difficult job to accomplish within a decade.

2. The education effect to the demographic dividend has been negative throughout the last four decades in Bangladesh.

3. It is projected that the economic support ratio in the future will be accompanied by a negative age effect and that this negative effect will be mitigated by a positive education effect to some extent.

4. The labour income profile has not been stimulated by the demographic dividend, though this is considered a major factor in achieving favourable progress in the support ratio.

5. The challenge for the Government of Bangladesh is to keep a vigilant focus on how to mitigate the negative age effects and to support, the low-educated population in their old age, having retired from informal sector employment.

The focus of the study was limited to the first demographic dividend of the country. The study finds the presence of a moderate support ratio, which further indicates the importance of the government having a mediating role in the goods market, especially in education and health sectors. Since the country has been primarily escalated to the category of a Lower Middle Income Country (LMIC) and is expected to have the status finally within the next few years, financial assistance and grants from international communities will fall. The country must finance the support schemes on an alternative self-dependent module. This has an implication for its internal revenue collection and foreign direct investment. Though the timeline found in the study has implications for the country, we cannot categorically state that all opportunities will be gone by that time. For a comparative analysis, Bangladesh is expected to have a considerable quantity of young population members that can be used more efficiently. Educational investment can be a channel to alter the future that is being projected. The study found no strong clue to predict that the female labour

force participation scenario will be dramatically changed in near future. It is also frustrating that the youth population did not have a positive impact on the labour market.

The study recognizes that a general equilibrium analysis would find better recommendations for the labour market. Further studies can be undertaken using a general equilibrium technique to analyse the possibility of capitalizing on the demographic dividend. The second demographic dividend or the role of future savings was not the concern of this study; thus, this study is unable to comment on what the future second demographic dividend will be.

References

- Ando, A., & Modigliani, F. (1963). The " life cycle" hypothesis of saving: Aggregate implications and tests. *The American economic review*, 53(1), 55-84.
- Bangladesh Bureau of Statistics (Various Years). *Report on The Labor Force Survey*
- (Various Years). *Report on Household Income Expenditure Survey*
- Becker, G. S., & Lewis, H. G. (1973). On the Interaction between the Quantity and Quality of Children. *Journal of political Economy*, 81(2, Part 2), S279-S288.
- Bloom, D. E., & Freeman, R. B. (1986). The effects of rapid population growth on labor supply and employment in developing countries. *Population and Development Review*, 381-414.
- Bloom, D. E., & Williamson, J. G. (1998). Demographic transitions and economic miracles in emerging Asia. *The World Bank Economic Review*, 12(3), 419-455.
- Chaudhury, R. H. (2014). Will Bangladesh seize or squander the economic opportunity offered by the demographic dividend?. *Asia-Pacific Population Journal*, 29(2).
- Coale, A. J., & Hoover, E. M. (1958). Population growth and economic development in low-income countries. *Princeton University Press*.

- Cuaresma, J. C., Lutz, W., & Sanderson, W. (2014). Is the demographic dividend an education dividend?. *Demography*, 51(1), 299-315.
- Deaton, A., & Zaidi, S. (2002). *Guidelines for constructing consumption aggregates for welfare analysis* (Vol. 135). World Bank Publications.
- Gupta, P. D. (1993). Standardization and decomposition of rates: a user's manual (No. 186). *US Department of Commerce, Economics and Statistics Administration, Bureau of the Census*.
- Khan, M. R. (1984). Economic Development and Population Policy in Bangladesh. *The Bangladesh Development Studies*, 1-18.
- Khondokar, B. H. & Rahman, M. M. (2017). Bangladeshe Jonosonkhya tattik subidhar Prakkolon: National Transfer Account er Proyog, *Bangladesh Unnoyon Somikkhya*
- Khondokar, B. H. & Rahman, M. M. (2016). Will Bangladesh miss out on first demographic dividend?. *Thinking Aloud*. Volume 2, Issue 8
- Kitagawa, E. M. (1955). Components of a difference between two rates. *Journal of the American Statistical Association*, 50(272), 1168-1194.
- Lee, R., & Mason, A. (2010). Fertility, human capital, and economic growth over the demographic transition. *European Journal of Population*, 26(2), 159-182.
- Li, J. (2017). Rate decomposition for aggregate data using Das Gupta's method. *Stata Journal*, 17(2), 490-502.
- Lutz, Butz, and K.C. (2014). *World Population and Human Capital in the Twenty-First Century*. Oxford University Press
- Mason, A., Lee, R., Abrigo M. & Lee, S. (2017). Support Ratios and Demographic Dividends: Estimates for the World. *UN Technical Paper*, 2017/A.
- Oaxaca, R. (1973). Male-female wage differentials in urban labor markets. *International Economic Review*, 693-709.

Rentería, E., Souto, G., Mejía-Guevara, I., & Patxot, C. (2016). The Effect of Education on the Demographic Dividend. *Population and Development Review*, 42(4), 651-671.

Rahman, R. I. (2014). Demographic Dividend and Youth Labor Force Participation in Bangladesh. *Bangladesh Institute of Development Studies*, Research Report No. 187

Samir, K. C., & Lutz, W. (2014). Demographic scenarios by age, sex and education corresponding to the SSP narratives. *Population and Environment*, 35(3), 243-260.

Vargha, L., Gál, R. I., & Crosby-Nagy, M. O. (2017). Household production and consumption over the life cycle: National Time Transfer Accounts in 14 European countries. *Demographic Research*, 36, 905-944.

University Grants Commission. (2006). *Strategic Plan for Higher Education in Bangladesh: 2006–2026*.

University Grants Commission. (2011). *Annual Report 2011*.

Wang, J., Rahman, A., Siegal, H. A., & Fisher, J. H. (2000). Standardization and decomposition of rates: Useful analytic techniques for behavior and health studies. *Behavior Research Methods, Instruments, & Computers*, 32(2), 357-366.

Wittgenstein Centre for Demography and Global Human Capital (2015). Wittgenstein Centre Data Explorer Version 1.2. <http://www.wittgensteincentre.org/dataexplorer>.

Appendix

Table A. 1: Labor Force characteristics of 15-30 years aged population

LFS 2009 - 10 (age 15 to 30)				LFS 2015 - 16 (age 21 to 36)	
Status	Percent	Educational Status	Percent	Status	Percent
Included in labor force	50.6276	Student	20.37	Included in labor force	63.18
Not in labor force	49.3723	Not Student	79.63	Not in labor force	36.82
Total	100	Total	100	Total	100

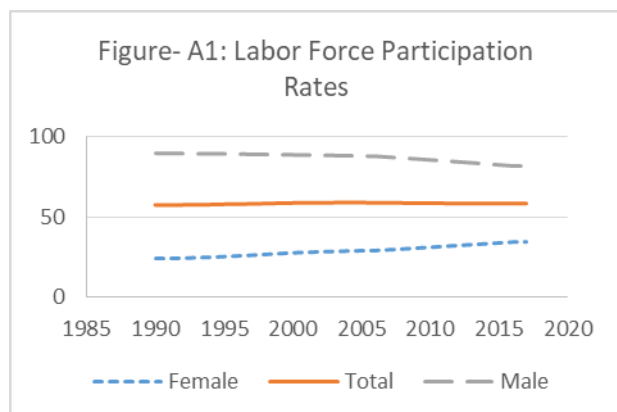
Source: BBS Labor Force Surveys

Table A. 2: Labor Force characteristics of 25-30 years aged population

LFS 2009 - 10 (age 25 to 30)				LFS 2015 - 16 (age 31 to 35)	
Status	Percent	Educational Status	Percent	Status	Percent
Included in labor force	64.2382	Student	3.78	included in labor force	67.24709
Not in labor force	35.7618	Not Student	96.22	not in labor force	32.75291
Total	100	Total	100	Total	100

Source: BBS Labor Force Surveys

Figure A. 1: Labor Force Participation Rates



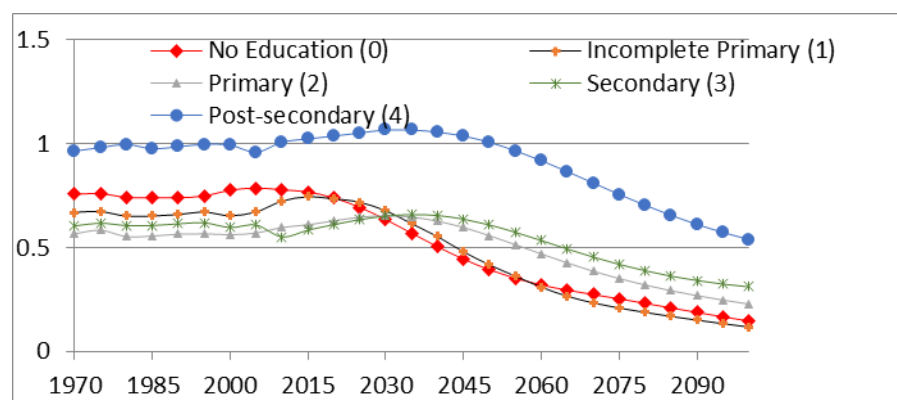
Source: World Development Indicators

Figure A. 2: Formal Employment: Male versus Female



Source: BBS Labor Force Surveys

Figure A. 3: Educational status wise ESR (Conventional Development)



Source: Authors' Calculation