Economic and Financial Analysis

Project Number: 44213-018
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People's Republic of Bangladesh: Secondary Education Sector Investment Program – Tranche 3

Asian Development Bank

ECONOMIC AND FINANCIAL ANALYSIS

A.   Sector Context

1.   This analysis is for the processing of the third tranche of the multitranche financing facility (MFF) for the Secondary Education Sector Investment Program. As an intrinsic part of the program, the third tranche (2018–2019 to 2019–2023) aligns with the country's Secondary Education Sector Road Map, in light of the National Education Policy (2010), with consistent objectives to contribute to enhanced quality and relevance, increased equitable access and retention, and strengthened management and governance for secondary education.

2.   Bangladesh's secondary education sector has improved considerably since 2011. The latest publication from the Bangladesh Bureau of Educational Information and Statistics, 2015 shows the improved enrollment rate (gross and net), completion rate, and internal efficiency. The gender parity is balancing with girl-to-boy ratio in secondary education enrollment moderating from 1.14 in 2012 to 1.08 in 2015. As the MFF's first and second tranches were to be completed in 2018, it is necessary to review the latest progress in the sector, prior to the program implementation kick-off, to ensure the program's settings capture well the sector's momentum.

3.   As of 2015, the Bangladesh secondary education system enrolls more than 13.9 million students in around 31,000 schools and madrasahs, with around 372,000 teachers. This enrollment data exceeds the 10-year projection made in Tranche 2 of the Secondary Education Sector Investment Program because of faster than expected rise in gross enrollment rate (GER). With the existing progress of the sector, the target value of some key performance indicators, such as the GER, needs to be updated. The updated target for 10 years of the program is to develop capacity to enroll more than 15.9 million students (Table 1).[1]

Table 1: Summary of Projections with and without the Investment Program ('000)

Item	2011	2023 (original)	2015	2023 (updated)	Change (2015–2023)
			Without Program		
No. of students (grades 6–12)	11,179	12,966	13,965	13,759	-21
No. of teachers	342	400	372	402	30
No. of institutions (secondary and above)	29	33	31	34	4
No. of stipend recipients	3,354	3,890	3,761	4,151	391
			With Program		
No. of students (grades 6–12)	11,179	14,657	13,965	15,931	1,966
No. of teachers	342	489	372	466	93
No. of institutions (secondary and above)	29	37	31	40	9
No. of stipend recipients	3,354	4,397	3,761	5,457	1,788

Source: Government of Bangladesh, Bangladesh Bureau of Educational Information and Statistics. 2015. Dhaka; Asian Development Bank estimates.

4.   Dialogue and consultation with the Ministry of Education (MOE) confirmed the need to update the relevant outcome indicators of the Secondary Education Sector Investment Program by referring to the recent sector performance and considering the capacity for further progress. The present analysis is conducted based on the updated outcome indicators by setting FY2017 as the analytical baseline.

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[1] The number of students (grades 6–12) in 2023 is updated based on World Bank's database *Single age (0 to 75+) Population separated by Sprague Multiplier (2018-2025)*. The number of teachers, institutions, and stipend recipients are updated accordingly based on the revised number of students.

B. Economic Analysis

5. **Economic rationale for continuing investment in secondary education.** Bangladesh significantly increased the secondary education enrollment rate, with GER rising from 60% in 2013 to 63% in 2015, totaling to an increment of 1.5 million students. The big jump of enrollment requires the complementary improvement in educational quality and in relevance to the market. The projected further increase in enrollment by 2023 without the investment program will decline by 0.2 million students (with 2015 as base year) because of the shrinking age (11–17 years old) population. The investment program, which pursues enhancing the efficiency of secondary education, will lead to an increased enrollment of 1.97 million students. The net increase in enrollment consists largely of students from poor background (51%). This shows strong pro-poor effect of the investment program, considering that the national headcount poverty rate is 31.5% (Household Income and Expenditure Survey, 2010). The strong sector performance to address basic human needs justifies continued financing under the disbursement-linked indicator-driven MFF approach.

6. **Rate of return analysis.** The economic viability of the investment program has been assessed using two approaches: (i) a Mincerian wage equation to estimate the returns on education (not program-specific) based on the Labor Force Survey in 2010; and (ii) cost–benefit analysis to compare incremental benefits and costs specific to Tranche 3. Under the former approach, returns are measured as the increase of earnings relative to those of the base group with no education, by controlling other factors (Table 2): returns on education for monthly wage earners are around 22% for some secondary educated,[2] and 39% (51%) for secondary (higher secondary) school certificate holders. The second approach suggests an economic internal rate of return (EIRR) of 10.4% in the baseline scenario (see section D for detailed discussion).

Table 2: Regression Estimates of Returns to Education by Gender

| | Dependent Variable: Log of Monthly Earning | | |
	Male	Female	Total
Age	0.02***	0	0.02***
Age2	0	0	0
Rural	(0.17)***	(0.05)**	(0.16)***
Class I-V	0.10***	0.08***	0.10***
Class VI-VIII	0.21***	0.13***	0.20***
Class IX-X	0.25***	0.19***	0.25***
SSC/equivalent	0.40***	0.28***	0.39***
HSC/equivalent	0.52***	0.41***	0.51***
Bachelor	0.72***	0.62***	0.71***
Master	0.86***	0.78***	0.85***
Engineering/medical	1.28***	1.18***	1.26***
Technical/vocational	0.66***	1.13***	0.69***

HSC = higher secondary school certificate, SSC = secondary school certificate.
Note: Asterisks denote confidence level as indicated by t-statistics (* for 90%, ** for 95%, and *** for 99%).
Source: Government of Bangladesh, Bangladesh Bureau of Educational Information and Statistics. 2010. Labor Force Survey. Dhaka; Government of Bangladesh, Bangladesh Planning Commission. 2015. Earnings Inequality, Returns to Education and Demand for Schooling: Addressing Human Capital for Accelerated Growth in the Seventh Five-Year Plan of Bangladesh. Dhaka.

C. Distribution Analysis

7. The secondary education system in Bangladesh is inequitable, as indicated by rural schools' substantially lower performance than the average and the lack of qualified and

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[2] It is a weighted average of the 20% return for class VI–X and the 25% return for class XI–XII.

experienced teachers, particularly in disadvantaged locations. Although the GER for girls have largely surpassed those for boys, the completion rates for girls are lower and drop-out rates are higher. Test score results indicate considerable student under-achievement on the part of lower wealth categories compared to higher wealth categories. The school choice by economic classes varies and already creates quality divide in human capital. Disparity in education quality at various levels all translate into the diversified return to education for students (Table 3).

Table 3: Average Monthly Earning per Worker (in Taka) Distribution

Institution	Rural			Urban			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Government	5,235	4,710	5,189	8,568	6,718	8,271	6,991	6,088	6,875
Private (government grants)	5,985	4,574	5,781	7,986	6,933	7,838	7,198	5,983	7,026
Private (nongovernment grants)	7,957	2,100	7,399	8,690	4,121	8,358	8,491	3,447	8,093
Madrasah (government-affiliated)	5,073	2,176	4,814	5,393	1,317	5,143	5,211	1,890	4,953
Madrasah (Kowmi)	5,566	2,000	5,411	5,338	3,333	4,836	5,517	2,889	5,262

Source: Government of Bangladesh, Bangladesh Bureau of Educational Information and Statistics. 2010. *Household Income and Expenditure Survey.* Dhaka; Government of Bangladesh, Bangladesh Planning Commission. 2015. *Earnings Inequality, Returns to Education and Demand for Schooling: Addressing Human Capital for Accelerated Growth in the Seventh Five-Year Plan of Bangladesh.* Dhaka.

8.   The investment program addresses equity and basic education needs through several measures. In Tranche 3, a harmonized stipend program will be established based on poverty-targeting selection. The poorest and most disadvantaged students will benefit from the Student Support Initiative, which will be further extended to address the improvement of their retention and performance at school through four-pillared interventions: (i) Resource Teacher Program, (ii) National Campaign for Student Counseling, (iii) Community Awareness Program, and (iv) Upazila Awards Program. Incentive scheme for female teachers in geographically disadvantaged areas will be introduced. Tranche 3 will also strengthen the existing pre-vocational and vocational education program and expand them to new schools to improve labor market relevance, serving better the poorer students who face the pressing need to join job market upon completion of school.

D.   Cost–Benefit and Sensitivity Analysis

9.   **General assumptions.** The following approach and assumptions have been used:
  (i)   The official average exchange rate of Tk80 = $1.00 (FY2017) from Bangladesh Bank is used for converting foreign exchange costs to local currency equivalent for FY2019–2023.
  (ii)   All prices are valued in domestic price numeracies in 2017 constant prices.
  (iii)   Economic prices of investment costs and recurrent costs are estimated by converting the financial prices with a shadow exchange rate factor of 1.07 for traded goods (net of taxes and duties) and 1.0 for non-traded goods, as well as a shadow wage rate factor of 1.0 for skilled labor[3] and 0.75 for unskilled labor.[4]

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[3] It is assumed that there are no significant distortions in the wage rates of skilled labor.
[4] Conversion factors for the shadow exchange rate factor and shadow wage rate factor are based on recently approved ADB-financed projects in Bangladesh: (i) ADB. 2014. *Report and Recommendation of the President to the Board of Directors: Proposed Loan and Administration of Loan to the People's Republic of Bangladesh for the Third Urban Governance and Infrastructure Improvement (Sector) Project.* Manila; and (ii) ADB. 2014. *Report and Recommendation of the President to the Board of Directors: Proposed Multitranche Financing Facility to the People's Republic of Bangladesh for the Skills for Employment Investment Program.* Manila.

(iv)   Price contingencies and interests are excluded in the calculation of the EIRR, while physical contingencies are included because they represent the monetary value of additional real resources that may be required beyond the base cost to complete the program.

(v)   Taxes and duties are excluded because they represent transfer payments.

(vi)   A 6% economic discount rate has been used.

(vii)   The economic life of the program is assumed at 25 years.

10.   As mentioned in paras. 3 and 4, the economic analysis reflects the updated objective key performance indicators on secondary education sector. GER secondary education (grades 6–10) was 73% in 2015, and the target by 2023 is set at 82%. GER higher secondary education (grades 11–12) reached 51% by 2012 but has moderated to 39% by 2015. It is expected to improve given the strengthened program and the target by 2023 is set at 55%.

Table 4: Updated Program Objective Key Performance Indicators

Result Indicators	Actual (2015)	Baseline (2017)	Target (2023)
GER secondary education	73%	69%	82%
GER higher secondary education	39%	52%	55%

GER = gross enrollment rate.
Source: Government of Bangladesh, Bangladesh Bureau of Educational Information and Statistics. 2015. Dhaka and Asian Development Bank estimates.

11.   **Assumptions for estimating benefits.** The current analysis follows the same approach adopted for the initial one conducted for the processing of Tranche 2. Benefits are assumed as below to generate from (i) increased equitable participation, (ii) enhanced internal efficiency with reduced repetition and drop-out, and (iii) improved employability and completer's higher earnings.

(i)   The investment program will contribute to drop-out and repetition rates declining more quickly. The completion rate will increase from 60% (80%) in 2017 to 78% (90%) in 2023 for secondary (higher secondary) education. The higher improvement in secondary education can be explained in view of continued intervention from the investment program for grades 6–12.[5]

(ii)   Internal efficiency reduces the number of student-years to complete the secondary cycle per graduate. With an assumed improvement of internal efficiency from 71% (78%) in 2017 to 75% (86%) in 2023 for secondary (higher secondary) education, the investment program will increase the saving of student-years per completer, from 7.02 (2.57) years to 6.67 (2.32) years.[6] Savings apply to public unit costs and private household expenditure for students already in the system.[7] Benefit begins from year 1 (with gradual increase by 25%) as existing students can already start benefiting from the program.[8]

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[5]   The benefit from increased completion rate is imputed by multiplying the incremental number of students who complete the program with the wage premium of secondary (higher secondary) education.

[6]   Internal coefficient of efficiency is a ratio of expected student-years required (5 years for secondary school certificate and 2 years for higher secondary school certificate) to complete the cycle by the graduates and the total years actually spent to produce those graduates expressed in percentage terms. It is 70% for grades 6–10 and 75% for grades 11–12 in 2015 (Bangladesh Bureau of Education Information and Statistics, 2015).

[7]   The benefit from improved internal efficiency is imputed by multiplying it with the costs saved due to reduced time spent in schools.

[8]   The Secondary Education Sector Investment Program is ADB's continual intervention in Bangladesh's secondary education sector closely following the Secondary Education Sector Development Program completed in 2013, and World Bank's cofinancing (see also para. 12) is an additional financing approved upon the completion of its original Secondary Education Quality and Access Enhancement Project in 2013. Tranche 2 started in 2014 and is expected

(iii)   The workforce participation rate is 45% for secondary completers and 60% for higher secondary completers.[9] Monthly wages are used to price the benefits.

(iv)   A secondary (higher secondary) completer earns 17% (29%) higher wages than a non-completer (see the discussion of the Mincerian regression in para. 6).

(v)   A relatively conservative 5% of the wage of a secondary completer is credited to higher-quality education, an external efficiency factor that results in a higher wage premium for all secondary completers (same source as for assumption iii). Although modest, this gain is larger than the 2% assumed for Tranche 2 to reflect the much larger expenditure on teachers' salary and stipend for students (see discussion of costing in para. 12).

(vi)   The benefit stream accruing from lifetime earnings for grade 10 and 12 new completers are assumed to continue for 25 years (a typical secondary completer will earn beyond 25 years, but discounting makes the value insignificant beyond this period). These completers are from eight (five) batches of grade 10 (12) students who are covered by the investment program in FY2014–2017. With gradual increase by 25%, the benefit starts from year 2 considering that completers from year 1 will spend some time looking for job.

12.   **Assumptions underlying estimation of costs.** As the Secondary Education Sector Investment Program is a transition to future adoption of a sector-wide approach (SWAp), the program investment is the estimated additional cost above ongoing spending on secondary education. The full economic costs include this investment program funding from the government (excluding nondevelopment budget) and ADB, parallel financing from the World Bank and Export-Import Bank of Korea, and private costs in terms of direct household outlays and opportunity costs. Additional program investment is derived from the difference between without-program spending (including associated recurrent costs and other projects' costs on secondary education) and the proposed investment program estimates. For FY2019–2023, the differential investment is expected to total $2,536 million, comprising of $372 million as capital costs and $2,164 million as recurrent costs. Note that the recurrent costs are significantly higher than the $316 million for Tranche 2, mainly because of (i) significant increases in teacher compensation including salary subvention to 64,500 additional teachers, incentive for 78,000 teachers, as well as the full implementation of new pay scale (basic pay and allowances) in 2016 that almost doubled the previous pay scale for all teachers, which are included as program costs; and (ii) harmonization of stipend programs, significantly increasing stipends provided by the program. In addition to program spending, household outlays ($123.2 and $216.8 per student per annum respectively for each secondary and higher secondary student) and opportunity costs[10] ($632.6 and $698.3 per annum respectively for each secondary and higher secondary student) are included for additional enrollees (see Household Income and Expenditure Survey, 2010). After FY2023, the government will continue spending to meet incremental recurrent costs, except program management costs.

13.   **Economic internal rate of return estimates.** Based on the benefit and cost streams described above, the net present value of the program is estimated at $1,498.8 million and EIRR at 10.4% (Table 5). The EIRR is lower than the estimate for Tranche 2. Note that the recurrent

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to complete in 2018. Given there is no break between the interventions, and considered that in Bangladesh secondary education sector has been experiencing considerable year-on-year improvement, it is justified that benefit can start from the first year of intervention.

[9] ADB. 2013. *Report and Recommendation of the President to the Board of Directors: Proposed Multitranche Financing Facility to the People's Republic of Bangladesh for the Secondary Education Sector Investment Program.* Manila.

[10] Opportunity cost is calculated as the product of incremental secondary enrollment and the income these students would make if they fail to enroll to secondary schools.

costs are significantly higher than the $316 million for Tranche 2. There are three key factors: (i) significant increases in teacher compensation including salary subvention to 64,500 additional teachers, incentive for 78,000 teachers, as well as the full implementation of new pay scale (basic pay and allowances) in 2016 that almost doubled the previous pay scale for all teachers, which are included as program costs; (ii) increasing stipends provided by the program; and (iii) decreasing population trend during the project period also reduce the potential project gain. The actual EIRR is likely to be higher as the benefits from improved education quality is estimated conservatively given the significant improvement in compensation to teachers and financial supports to students, which should help raise teaching quality. Moreover, positive externalities and longer-term intergenerational social benefits that come with higher educational attainment, including lower fertility rates and improved health outcomes, are difficult to quantify and not included in the benefits estimates.

Table 5: Economic Internal Rate of Return based on Base Case Scenario (Tk million)

| | Costs | | | | Benefits | | | Net |
Year	Capital	Recurrent	Private	Total	Internal Efficiency	External Efficiency	Total	Benefit
1	2,653	28,768	11,943	43,364	4,328		4,328	(39,036)
2	4,897	32,338	23,662	60,897	8,608	8,128	16,736	(44,160)
3	7,976	35,579	35,192	78,746	12,827	9,889	22,716	(56,031)
4	8,078	37,882	46,490	92,450	16,948	13,698	30,646	(61,803)
5	6,172	38,517	50,134	94,823	16,948	20,389	37,337	(57,486)
6		17,668		17,668	16,948	28,633	45,581	27,913
7		17,668		17,668	16,948	32,744	49,692	32,024
8		17,668		17,668	16,948	36,855	53,803	36,135
9		17,668		17,668	16,948	40,965	57,913	40,246
10		17,668		17,668	16,948	40,965	57,913	40,246
11–25	0	265,019	0	265,019	254,220	614,482	868,702	603,683
					NPV at 6%=	**119,906**	**IRR =**	**10.44%**

IRR = internal rate of return, NPV = net present value.
Source: Asian Development Bank estimates.

14. **Sensitivity analysis.** A sensitivity analysis examined the impact of downside risks on the EIRR (Table 6). The low case for external efficiency includes lower than expected benefits from the increase in completers and their wage premium for increased quality by 25%. The low case for internal efficiency assumes that the benefits from enhanced internal efficiency is 25% lower than expected. Capital and/or recurrent cost overrun by 15%, or delay of implementation by 1 year are also considered. In all cases, the EIRR is more than 6% the cut-off rate. It shows that the program is a sound investment, but emphasis should be given most on smooth implementation. It also indicates that external efficiency has more impact than internal efficiency, reflecting the need to stress more on improving external efficiency when the baseline sector performance has reached a relatively high level in terms of larger enrollment.

Table 6: Sensitivity Analysis

Scenario	Sensitivity Parameter	Variation	EIRR	NPV ($ million)
1	Base case		10.44%	1,498.82
2	External efficiency	-25%	6.81%	253.33
3	Internal efficiency	-25%	8.54%	856.65
4	Capital costs	+15%	10.25%	1,449.99
5	Recurrent costs	+15%	8.59%	911.50
6	Delay of implementation	1 year	8.44%	911.97
7	Both external and internal efficiency	-15%	7.14%	366.22
8	Both capital and recurrent costs	+15%	8.43%	861.67

EIRR = economic internal rate of return, NPV = net present value.
Source: Asian Development Bank estimates.

E. Financial Analysis

15. **Medium-term budget framework estimates.** The education budget is spent by the Ministry of Primary and Mass Education, which is responsible for primary education, and MOE, which is responsible for post-primary education, including secondary, technical and vocational, and higher education. According to the medium-term budget framework, government spending on education is low, as the share of education expenditure in the gross domestic product (GDP) has been stagnant at around 2.0%: 1.96% in FY2014, 1.93% in FY2015, 1.83% in FY2016, and 2.21% in FY2017. In FY2019–2023, MOE's budget spending is estimated at $24.9 billion for the 5 years (Table 7), taking up 58.4% of education budget. As the government expects from FY2018 to adopt SWAp for secondary education, the Secondary Education Sector Investment Program in FY2019–2023 is equivalent to the total secondary education sector investment plan, which is estimated as $19.6 billion, accounting for 78.6% of MOE's budget.

Table 7: Government Spending on Secondary Education ($ million)

	Items	FY2019	FY2020	FY2021	FY2022	FY2023	Total
1	Education budget	6,211	6,832	8,213	9,839	11,553	42,649
2	MOE budget	3,656	4,077	4,863	5,724	6,595	24,916
3	SESIP*	3,031	3,683	4,188	4,282	4,401	19,584

MOE = Ministry of Education, SESIP = Secondary Education Sector Investment Program.
Note: * It is equivalent to the budget allocated to secondary education sector investment plans. It includes ADB, World Bank, and Export-Import Bank of Korea loans and government cofinancing.
Source: Asian Development Bank estimates based on medium-term budget framework forecast.

16. **Fiscal affordability and sustainability.** The government's resource envelope for secondary education subsector is estimated on the basis of (i) GDP growth in current prices of 13.0% per annum in 2017 and 2018 and 13.1% onwards (the medium- to long-term scenario), (ii) allocation of 2.3% of GDP for education by FY2023, (iii) 59% of the education budget allocated to MOE, and (iv) 84% of the MOE budget allocated to secondary education. Based on these assumptions, the updated estimate of secondary education budget envelope is $30.6 billion for FY2014–2023 (Table 8).

Table 8: Resource Envelope (FY2014–2023)

	FY2014–2018		FY2019–2023		Total Program	
	Old	Updated	Old	Updated	Old	Updated
A. GDP	968	1,106	1,639	2,019	2,607	3,125
B. Budget envelope ($ billion)						
Education sector	20.5	22.2	36.7	42.6	57.2	64.8
MOE	11.0	12.2	19.8	25.2	30.8	37.3
Secondary education subsector	8.8	9.5	16.2	21.1	25.0	30.6
C. Investment plan ($ billion)						
Secondary education subsector	8.5	8.5	11.0	19.6	19.4	28.0
SESIP	6.1	6.1	11.7	19.6	17.8	25.7
D. ADB financing ($ million)	275	275	225	225	500	500
As % of secondary education envelope	3.1	2.9	1.4	1.1	2.0	1.6
As % of SESIP	4.5	4.5	1.9	1.1	2.8	1.9
E. Parallel cofinancing ($ million)	362	362	0	510	362	872
As % of secondary education envelope	5.4	3.8	0	2.4	1.4	2.9
As % of SESIP	5.9	5.9	0	2.6	2.0	3.4
F. SESIP contribution as % of secondary education envelope	69.1	64.5	72.1	92.7	71.1	84.0

ADB = Asian Development Bank, GDP = gross domestic product, MOE = Ministry of Education, SESIP = Secondary Education Sector Investment Program.
Source: Asian Development Bank estimates.

17.   The estimated resource envelope indicates that the Ministry of Finance can allocate to secondary education investment plan $9.5 billion (of which $6.1 billion for Secondary Education Sector Investment Program) during FY2014–2018, and $21.1 billion (of which 19.6 billion for Secondary Education Sector Investment Program) during FY2019–2023. The Secondary Education Sector Investment Program's contribution to secondary education envelope increases to 92.7% during FY2019–2023. It results from two factors: (i) increased parallel financing from development partners, and (ii) all the nondevelopment expenditures of the sector investment plans are considered. This high ratio is consistent with MOE's vision of switching to SWAp for the secondary education in FY2018, and the function of the Secondary Education Sector Investment Program as the transition platform to SWAp. With the increase in total education and MOE budget envelope during FY2019–2023, the secondary education envelope will increase by $11.6 billion and can thus support the increased spending needs. The contribution of the Secondary Education Sector Investment Program to the secondary education envelope in FY2019–2023 is revised up from 72.1% to 92.7%.

18.   The long-term sustainability of the investment program will depend on three factors: (i) adequate budget allocated to MOE to cover estimated investments and associated recurrent expenditures as per the medium-term budget framework projection, (ii) improvements in secondary education quality and efficiency as envisaged, and (iii) the institutionalization of the program as part of the regular government program to adopt SWAp. Sustainability considerations are built into the program design through the (i) use of the country system for budgeting, accounting, reporting, and auditing; (ii) strengthening of institutions involved in secondary education, which will sustain improvements in the sector; and (iii) emphasis on disbursement-linked indicators to ensure increased allocation to secondary education.