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Exchange Rate and Stock Market Development in Bangladesh

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Abstract

With the acceleration of globalization and increasing economic interdependence, the association between stock market development and foreign exchange rate is attracting attention from the policymakers. This study examines the cointegrating relationship between stock market development and the nominal exchange rate for Bangladesh over the period 1980-2019, controlling for trade openness, and domestic and foreign price levels. The bounds testing approach to cointegration analysis is applied. Results indicate the existence of a cointegrating relationship between nominal exchange rate and stock market development. The significantly positive long-run effect of an increase in the nominal exchange rate on stock market development suggests that depreciation in Bangladeshi Taka will enhance stock market development. The short-run effect of an increase in the exchange rate on stock market development is, however, significantly negative. The results, overall, confirm that foreign exchange rate is an important factor in determining stock market development in Bangladesh.

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1. Introduction

Increasing domestic savings, accelerating capital movements, and creating channels to transfer funds into efficient industrial sectors, a stock market supplies oxygen to the financial system of an economy. An efficient stock market stimulates competition amongst financial instruments which, in turn, yields higher expected returns to the investors. By channeling capital to efficient industrial sectors in an economy, the stock market stimulates production, employment, exports, and so on. Stock market capitalization is considered a good proxy for stock market development, and it has been used in numerous empirical studies (see Levine and Zervos, 1996; Demiruge-Kunt and Levine, 1996; Gracia and Liu, 1999). Stock market capitalization has two integral parts – one, the market value of outstanding shares, and two, the number of outstanding shares; therefore, the market price of a share is expected to have a significant influence over stock market capitalization. To find out the impact of foreign exchange rate on stock market development, understanding the linkages between exchange rates and stock prices is important. The flow oriented models, first described by Dornbusch and Fisher (1980), assume that fluctuations in exchange rates can directly influence stock prices. The flow oriented model depends on the idea that share prices represent the accumulation of discounted present value of future cash flows of a firm. Any factor that affects a firm's expected future cash flows is expected to affect the share price of the firm.

Foreign exchange rate influences stock market development in several ways. Firstly, domestic currency depreciation, i.e., an increase in the foreign exchange rate, in the short-run, increases exchange rate risk for foreign portfolio investors. This would decrease stock prices (Janeway, 1978). Secondly, in the long-run, currency depreciation stimulates the flow of foreign portfolio investment that ultimately increases stock price (The Wall Street Journal, 1978). Thirdly, depreciation of the domestic currency can make local stocks more attractive to the importers, thereby increasing export earnings of the home country. Thus, the intrinsic value of the stocks of export-oriented firm increases. A decrease in the foreign exchange rate raises the price of imported products and inputs. If the import-oriented firms fail to raise the local price of products, then the profitability of the firms will decline; consequently, the intrinsic value of the firm will decline, leading to a decline in the stock price (Hopper and Barbara, 1979). Fourthly, fluctuations in the exchange rate can influence the share prices of overseas wings of multinational firms (Agarwal, 1981). Finally, domestic currency depreciation may trigger a higher expected inflation, creating skepticism about the firm's future performance; thus, stock prices could decline in the short-run.

The objective of this paper is to evaluate whether stock market development and foreign exchange rate are cointegrated. This paper also attempts to distinguish the short-run effects of fluctuations in the foreign exchange rate on stock market development from the long-run effects. Although numerous studies have examined this issue, the results are mixed and inconclusive. The confusing empirical evidence necessitates a reinvestigation of the association between the foreign exchange rate and stock market development. Finally, we discuss policy recommendations based on the empirical findings.

2. Literature Review

A number of studies exist on cointegration between stock market price and foreign exchange rate. According to Kim (2003), gradual raises in capital movements and international trade have generated a significant impact of exchange rate on stock prices. Aggarwal (1981) reported that devaluation of domestic currency has a positive impact on the stock price of export-oriented firms. Nieh and Lee (2001) argued that domestic currency value has influence on both home and foreign interest rates, affecting the value of a firm's assets. Ajayi and Mougoue (1996) found negative effect of depreciation of domestic currency on stock prices in the short-run. Dimitrova (2005) found that domestic currency depreciation causes stock market decline in the short-run. He stated that depreciation in domestic currency results in inflation, creating skepticism about firms` performance amongst investors; consequently, the market price declines. Granger et al. (2000) argued that currency depreciation can both increase and decrease a firm`s value depending on the trade flows specific to the firm. Muhammad and Rasheed (2002) reported that depreciation in domestic currency leads to competition among the local firms, increasing exports which, in turn, increase their share prices. Mukherjee and Naka (1995) found long-run positive effect of exchange rate with a coefficient of 0.39 for the Japanese stock price. Acikalin et al. (2008) found that exchange rates and stock prices are cointegrated in Istanbul Stock Price. Olugbenga (2012) found significant negative effects on stock prices in the long-run. Bello (2013) found that the US stock market returns are negatively, significantly, and consistently associated with the Japanese Yuan but positively, significantly, and consistently associated with the Euro and the Pound Sterling. Chkili and Nguyen (2014) found that exchange rate movements cannot influence the stock market returns in the BRICS countries.

From the review of the articles cited above, we conclude that there is a lack of general consensus on the effects of foreign exchange rate on stock market development. Table 1 summarizes articles providing confusing evidence of the effects of changes in foreign exchange rate on stock market development. Increases in foreign portfolio investment and export opportunities may increase the number of outstanding shares of firms that are in need of funds which, in turn, can increase stock market capitalization. This study accounts for the effects of changes in the foreign exchange rate on stock market development in Bangladesh by considering both (a) the market price of shares, and (b) the number of outstanding shares. To the best of our knowledge, there is no study on Bangladesh on this specific issue. This study aims to fill that gap in the existing literature.

Table 1. Mixed Evidence

Authors	Period	Sample	Methodology	Findings
Aggarwal (1981)	1974-1978	USA	OLS	Positive impact in the long-run
Ajayi and Mougoue (1996)	1985-1991	8 advance economics	VAR	Negative impact in the short-run
Mukherjee and Naka (1995)	1971-1990 (Monthly)	Japan	Cointegration test and VECM	Positive impact in the long-run
Acikalin et al.(2008)	1991-2006 (Quarterly)	Turkey	Johansen Cointegation test and VECM	Positive impact in the long-run
Muhammad and Rasheed (2002)	1994-2000 (Monthly)	4 South Asian Countries	Johansen Cointegration test and VECM	Long-run cointegration in case of Bangladesh and Sri Lanka
Dimitrova (2005)	1990-2004 (Monthly)	USA, UK, Brazil, Malaysia	2SLS, OLS	Negative impact in the short-run
Yu (1997)	1983-1994 (Daily)	Hong Kong, Tokyo, Singapore	Cointegation test	Positive impact in the long-run
Abdalla and Murinde (1997)	1985-1994 (Monthly)	Pakistan, Korea, India, Philippines	Cointegation test	Positive impact in the long-run in case of India and Philippines
Kim (2003)	1974-1998 (Monthly)	USA	Johansen cointegation test	Negative impact in the long-run
Soenen and Hanniger (1988)	1980-1986	USA	Johansen approach, Error Correction Model and Variance Decomposition	Negative impact in the long-run
Amare and Mohsin (2000)	1980-1998 (Monthly)	9 Asian Countries	Cointegration test	Long-run relationship found only in Singapore and Philippines

3. Data and the Model

Stock market development has been defined as the stock market capitalization as a percentage of GDP in current market prices (Hossain and Kamal, 2010). The time series data for stock market capitalization and gross domestic product have been collected from Bangladesh Bank, which is the Central Bank of Bangladesh. The data on nominal exchange rate, trade openness, domestic price level measured by CPI, Bangladesh, and foreign price level measured by CPI, United States, have been obtained from the WDI Statistics of the World Bank. The study period is 1980-2019.

The long-run impact of changes in the foreign exchange rate on stock market development, controlling for trade openness, domestic price level, and foreign price level, is examined by estimating a model of the following form

$$lnS_{m_t} = \theta + \gamma_1 lnEX_t + \gamma_2 lnOP_t + \gamma_3 lnDP_t + \gamma_4 lnFP_t + \varepsilon_t \quad (1)$$

$lnA = \theta$ is a constant; γ_1, γ_2, γ_3, and γ_4 are the elasticities of stock market development with respect to the nominal exchange rate, trade openness, domestic price level, and foreign price level, respectively; S_{m_t} is the measure of stock market development at time *t*; EX_t is the nominal exchange rate at time *t*; OP_t is trade openness at time *t*, measured as the sum of exports and imports as a percentage of GDP; DP_t is the domestic price level at time *t*; FP_t is the foreign price level at time *t*. The increase in the nominal exchange rate implies depreciation of the Bangladeshi currency (BDT) relative to the United States Dollar (USD).

The estimated value of γ_1 can be positive in the long-run and also in the short-run. An increase in the nominal exchange rate is expected to increase foreign investment inflows into the stock market. The reason is, the foreign investors may anticipate that, due to the depreciation of BDT, firms' profits will significantly increase due to an increase in export earnings, thereby resulting in an increase in stock prices. If the Bangladesh economy becomes more liberalized, then with a depreciation of BDT, more foreign portfolio investment will enter into the economy that will increase stock market capitalization. Due to excess demand, stock prices are expected to rise. Since the capital market in Bangladesh is still inefficient and there exists information asymmetry, unexploited profit opportunities exist (see Bose et al. 2014; Hasan, 2015; Rahman et al., 2016; Chaity and Sharmin, 2012). The efficient market hypothesis states that current stock prices fully reflect all available information about the value of a firm, and there is no scope for earning excess profits. The efficient market hypothesis further proposes that, profiting from predictable price movements could be difficult and unlikely (Fama, 1969); therefore, the excess return from an inefficient market may cover the amount lost when converting the return from BDT to USD using the future exchange rate. Another implication is that, due to the depreciation of BDT, the value of a firm's exports will increase. As the Bangladesh economy is becoming increasingly dependent on exports, the firms' profits are expected to increase; consequently, the firms' equity value, or stock market capitalization, will increase. It is also possible for the estimated value of γ_1 to be negative both in the long-run and in the short-run if, due to the depreciation of BDT, there is an outflow of foreign investment from the stock market. This situation would arise if the investors expect BDT to depreciate even further in the future. This excessive withdrawal may pull down the stock market. If Bangladesh economy continues to be dependent on imports, then the value of imports will increase even with a depreciation of BDT. If that happens, then the firms' profits will decrease, and stock prices may fall in the short-run.

4. Results and Discussion

4.1 Unit Root Tests: In order to investigate the unit root problem, we apply the ADF test (Dicky and Fuller, 1979). We have also performed the PP (Phillips and Perron, 1987) and KPSS tests (Kwiatkowski et al., 1992). The results are reported in Table 2.

Table 2. Unit Root Tests

Model with only constant term [Level form]			
	ADF Test	PP Test	KPSS Test
lnS_m	-1.81 (0.37)	-1.62 (0.47)	0.73** [0.74; 0.45; 0.34]
$lnEX$	-3.07** (0.04)	-4.59*** (0.00)	0.77*** [0.74; 0.46; 0.35]
$lnOP$	-0.77 (0.81)	-0.74 (0.82)	0.67** [0.74; 0.46; 0.35]
$lnDP$	-1.87 (0.34)	-1.30 (0.62)	0.78*** [0.74; 0.46; 0.35]
$lnFP$	-5.87*** (0.00)	-5.28*** (0.00)	0.77*** [0.74; 0.46; 0.35]
Model with constant and trend terms [Level form]			
	ADF Test	PP Test	KPSS Test
lnS_m	-2.81 (0.20)	-1.98 (0.59)	0.08 [0.22; 0.15; 0.12]
$lnEX$	-2.27 (0.44)	-3.24* (0.09)	0.20** [0.22; 0.15; 0.12]
$lnOP$	-2.66 (0.26)	-2.82 (0.20)	0.10 [0.22; 0.15; 0.12]
$lnDP$	-2.51 (0.32)	-2.55 (0.30)	0.10 [0.22; 0.15; 0.12]
$lnFP$	-3.55** (0.05)	-3.30* (0.08)	0.20** [0.22; 0.15; 0.12]
Model with only constant term [Difference form]			
	ADF Test	PP Test	KPSS Test
ΔlnS_m	-4.33*** (0.00)	-4.33*** (0.00)	0.14 [0.74; 0.46; 0.35]
$\Delta lnEX$	-5.26*** (0.00)	-3.85** (0.01)	0.60** [0.74; 0.46; 0.35]
$\Delta lnOP$	-6.86*** (0.00)	-6.86*** (0.00)	0.16 [0.74; 0.46; 0.35]
$\Delta lnDP$	-3.53** (0.01)	-3.52** (0.01)	0.21 [0.74; 0.46; 0.35]
$\Delta lnFP$	-5.57*** (0.00)	-5.54*** (0.00)	0.72** [0.74; 0.46; 0.35]
Model with constant and trend terms [Difference form]			
	ADF Test	PP Test	KPSS Test
ΔlnS_m	-4.44** (0.01)	-4.38** (0.01)	0.05 [0.22; 0.15; 0.12]
$\Delta lnEX$	-6.09*** (0.00)	-4.79*** (0.00)	0.10 [0.22; 0.15; 0.12]
$\Delta lnOP$	-6.73*** (0.00)	-6.73*** (0.00)	0.15** [0.22; 0.15; 0.12]
$\Delta lnDP$	-3.55* (0.05)	-3.42* (0.06)	0.14* [0.22; 0.15; 0.12]
$\Delta lnFP$	-6.35*** (0.00)	-6.87*** (0.00)	0.10 [0.22; 0.15; 0.12]

***, **, and * denote significant at 1%, 5%, and 10% significance level, respectively. The values in [ ] are the asymptotic critical values of the KPSS test at the 1%, 5%, and 10% significance level, respectively. The lag-length is selected by AIC and SBIC.

All five variables suffer from the unit root problem in level form. After taking the first difference, the trend is found to disappear from each variable; therefore, the variables are I(1).

4.2 The Bounds Testing Approach to Cointegration: The bounds testing approach developed by Pesaran, Shin and Smith (Pesaran and Pesaran, 1997; Pesaran and Shin, 1999; Pesaran et al., 2001) has been applied within an autoregressive distributed lag framework (ARDL). To implement the bound test procedure, we have modelled the equation of interest as conditional ARDL framework specified below

$$\Delta lnS_{m_t} = \delta_0 + \sum_{j=1}^{p} \delta_{1j} \Delta lnS_{m_{t-j}} + \sum_{j=0}^{q} \delta_{2j} \Delta lnEX_{t-j} + \sum_{j=0}^{r} \delta_{3j} \Delta lnOP_{t-j} +$$

$$\sum_{j=0}^{s} \delta_{4j} \Delta lnDP_{t-j} + \sum_{j=0}^{v} \delta_{5j} \Delta lnFP_{t-j} + \alpha_1 lnS_{m_{t-1}} + \alpha_2 lnEX_{t-1} + \alpha_3 lnOP_{t-1} +$$

$$\alpha_4 lnDP_{t-1} + \alpha_5 lnFP_{t-1} \qquad (2)$$

The bounds testing approach to check the existence of a long-run relationship between the variables in level form is applicable irrespective of whether the underlying time series variables are I(0), I(1) or even fractionally integrated. The long-run relationship is determined by using the F-test. It tests the joint significance of the coefficients on the one-period lagged levels of the variables in equation (3), i.e., H_0: $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = 0$. The critical values for the F-test are obtained from Narayan (2004a, b, 2005a). If the computed F statistic falls outside the critical bounds, then a conclusive decision can be made regarding cointegration without knowing the order of integration of the regressors. If the computed F-statistic is higher than the upper bound of the critical values, then the null hypothesis of no cointegration is rejected. The results are reported in Table 3.

Table 3. Cointegration Test

	90% level		95% level		99% level	
K	*I*(0)	*I*(1)	*I*(0)	*I*(1)	*I*(0)	*I*(1)
4	1.9	3.01	2.26	3.48	3.07	4.44

Functional Forms	F- Statistic
$F_{lnS_m}(lnS_m/lnEX, lnOP, lnDP, lnFP)$	7.23^{***}

*** denotes significant at the 1% significance level. The lag-length is selected by AIC and SBIC. If the value of F-statistic exceeds the value of *I*(1), cointegration exists. If the value of F-statistic lies below the value of *I*(0), no cointegration exists. If the value of F-statistic lies in between the value of *I*(0) and *I*(1), decision will be inconclusive. K is the number of regressors.

When stock market development is the dependent variable in the model, a cointegrating relationship between stock market development, nominal exchange rate, trade openness, domestic price level, and foreign price level is identified. The estimated F-statistic exceeds the upper bound at the 99% level; thus, in the long-run, stock market development and the nominal exchange rate are expected to move together. Due to the cointegrating relationship, the long-run model is estimated by the ARDL approach proposed by Pesaran et al. (2001).

4.3 The Long-Run Model: The long-run model has the following $ARDL(p,q,r,s)$ specification

$$lnS_{m_t} = \emptyset_0 + \sum_{j=1}^{p} \emptyset_{1j} lnS_{m_{t-j}} + \sum_{j=0}^{q} \emptyset_{2j} lnEX_{t-j} + \sum_{j=0}^{r} \emptyset_{3j} lnOP_{t-j} + \sum_{j=0}^{s} \emptyset_{4j} lnDP_{t-j} + \sum_{j=0}^{v} \emptyset_{5j} lnFP_{t-j} + \omega_t \quad (3)$$

The lag-length is selected by AIC and SBIC. The long-run elasticity coefficients of stock market development with respect to foreign exchange rate are reported in Table 4.

Table 4. Long-Run Elasticity Coefficients

variables	coefficients	t-statistic	p-value
$lnEX$	3.21**	2.29	0.03
$lnOP$	1.88***	3.83	0.00
$lnDP$	0.21	0.38	0.71
$lnFP$	-4.15***	-5.58	0.00

*** denotes significant at the 1% significance level; ** denotes significant at the 5% significance level.

The long-run results indicate that foreign exchange rate has a significant positive effect on stock market development (see Aggarwal, 1981; Mukherjee and Naka, 1995; Acikalin et al., 2008; Yu, 1997; Abdalla and Murinde, 1997). For every 1% increase in the nominal exchange rate (depreciation of BDT), stock market development will increase by 3.21%. The significant positive effect of the nominal exchange rate on stock market development can be explained by the fact that the Bangladesh economy is becoming more export dependent, and the excess export earnings due to the depreciation of the Bangladeshi currency will generate more profit for the exporting firms, thereby resulting in an increase in stock prices. An increase in foreign portfolio investment in stocks of firms that are expecting an increase in export earnings, in order to exploit unexpected profit opportunities, is also expected to drive up stock prices.

The long-run effect of an increase in trade openness on stock market development in Bangladesh is significantly positive. An increase in the domestic price level on stock market development in Bangladesh is insignificant. An increase in the foreign price level, that is measured by the U.S. CPI, is found to have a significantly negative effect on stock market development in Bangladesh. Based on our definition of nominal exchange rate, an increase in the foreign price level will result in an appreciation of Bangladeshi Taka, which, in turn, will hinder stock market development in Bangladesh. Therefore, an increase in the foreign price level is expected to have a negative effect on stock market development in Bangladesh.

4.4 The Short-Run Model: The short-run model has the following $ARDL(p,q,r,s)$ specification

$$\Delta lnS_{m_t} = \theta_0 + \sum_{j=1}^{p} \theta_{1j} \Delta lnS_{m_{t-j}} + \sum_{j=0}^{q} \theta_{2j} \Delta lnEX_{t-j} + \sum_{j=0}^{r} \theta_{3j} \Delta lnOP_{t-j} +$$

$$+ \sum_{j=0}^{s} \theta_{4j} \Delta lnDP_{t-j} + \sum_{j=0}^{v} \theta_{5j} \Delta lnFP_{t-j} + \lambda ECM_{t-1} + \xi_t \quad (4)$$

Here, λ denotes the speed of adjustment toward long-run equilibrium, if there is any shock to the stock market development due to changes in the nominal exchange rate. It is expected that λ will be negative and significant, and its absolute value will be less than one. The $ECM(-1)$ is the one period lagged error term derived from the long-run cointegrating equation. The appropriate lag-length is selected by AIC and SBIC. The short-run coefficients and the diagnostic test results are reported in Table 5 and Table 6, respectively.

Table 5. Short-Run Elasticity Coefficients

Variables	Coefficients	t-statistic	p-value
$\Delta lnEX$	-4.37***	-4.23	0.00
$\Delta lnOP$	0.60	1.61	0.12
$\Delta lnDP$	1.99	1.23	0.23
$\Delta lnFP$	5.94***	3.64	0.00
$ECM(-1)$	-0.69***	-6.54	0.00

*** denotes significant at 1% significance level.

Table 6. Diagnostic Tests

	F-statistic	p-value
$F_{Autocorrelation}$	0.43	0.65
F_{ARCH}	0.14	0.71
$F_{Misspecificationn}$	0.55	0.47
$F_{Normality}$	0.62	0.73

The short-run results indicate that foreign exchange rate has a significant negative effect on stock market development (Ajavi and Mougoue, 1996; Dimitrova, 2005). The depreciation of Bangladesh Taka is expected to slow down stock market development in the short-run. The firms` import costs will increase; consequently, the firms' profit will decrease resulting in a decrease in the firms' share price. Moreover, the foreign investors may decide to sell the shares of those firms, which may hamper stock market development and the share prices. The $ECM(-1)$ coefficient is significantly negative; thus, a long-run relationship between stock market development and foreign exchange rate is established. Although the short-run effects of increases in trade openness and the level of domestic prices are insignificant, the effect of

an increase in the level of foreign prices on stock market development in Bangladesh is significantly positive.

For the LM test for autocorrelation, the p-value (0.65) is greater than the 10% significance level; thus, we fail to reject the null hypothesis of no autocorrelation at lag order. For the ARCH test, the p-value (0.71) is greater than the 10% significance level; thus, we fail to reject the null of no conditional heteroscedasticity. For the Ramsey RESET test, the p-value (0.47) is greater than the 10% significance level; thus, we fail to reject the null hypothesis that the model is correctly specified. For the normality test, the p-value (0.73) is greater than the 10% significance level; thus, we fail to reject the null hypothesis that the errors are normally distributed.

4.5 Stability of Short-Run Parameters: The stability of the short-run parameters is determined by the CUSUM and CUSUMSQ tests (Borensztein et al., 1998). The results are provided in Figure 1. The results indicate that the model is stable.

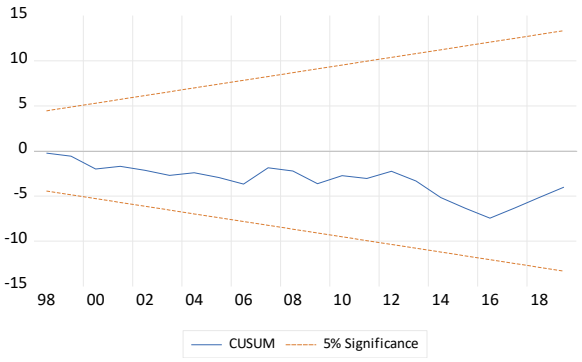

Figure 1a: CUSUM Test

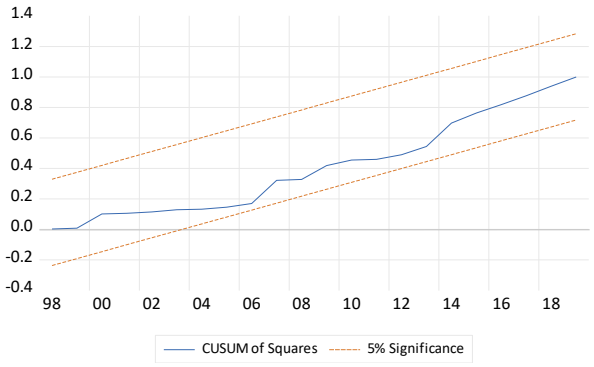

Figure 1b: CUSUMSQ Test

5. Concluding Remarks

This study has investigated the cointegrating relationship between stock market development and foreign exchange rate in Bangladesh for the period 1980-2019, controlling for trade openness, domestic price level, and foreign price level. The bounds testing approach confirms the existence of a cointegrating relationship. In the long-run, the significant positive effect of an increase in the nominal exchange rate on stock market development suggests that a depreciation of Bangladeshi Taka will enhance stock market development. The short-run effect of an increase in the nominal exchange rate on stock market development is negative and significant. Based on our findings, we propose that a depreciation of Bangladeshi Taka will enhance stock market development in Bangladesh.

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