



DETERMINANTS OF THE TAKA-US DOLLAR EXCHANGE RATE IN BANGLADESH: A Multiple Linear Regression Analysis, 2010–2024

MD. ALAMIN

Deputy Director, Research Department, Bangladesh Bank, Bangladesh.

Received: 11 March 2026; Revised: 20 April 2026;

Accepted 28 April 2026; Publication: 08 October 2026

Abstract: This paper investigates the macroeconomic determinants of the nominal Taka–US Dollar (BDT/USD) exchange rate in Bangladesh over the period 2010–2024 using multiple linear regression (Ordinary Least Squares). Drawing on annual data for the exchange rate, consumer price inflation, gross foreign exchange reserves, workers’ remittance inflows, the central bank policy (repurchase agreement, or repo) interest rate, and the current account balance as a share of GDP, the study estimates a model in which the exchange rate is regressed on these five explanatory variables. The estimated model explains a large share of the variation in the exchange rate ($R^2 = 0.888$; adjusted $R^2 = 0.825$) and is jointly significant ($F = 14.22$, $p < 0.001$). Remittance inflows and the policy interest rate emerge as statistically significant predictors of Taka depreciation at the 5% level, while inflation, reserves, and the current account balance, though carrying theoretically plausible signs in most cases, are not individually significant once the other variables are controlled for. The results are consistent with a narrative in which structural current-account and financial-account pressures, rather than any single textbook determinant acting alone, drove the sharp depreciation of the Taka after 2022, and in which the central bank’s rapid policy-rate tightening from 2022 onward should be read as a reaction to depreciation and reserve pressure rather than a cause of currency stability. The paper closes with a discussion of data limitations, model diagnostics, and policy implications for exchange rate and reserve management in Bangladesh.

Keywords: Bangladesh, exchange rate, Taka, regression analysis, remittances, foreign exchange reserves, monetary policy, inflation, current account

To cite this paper:

Md. Alamin (2026). Determinants of the Taka-US Dollar Exchange Rate in Bangladesh: A Multiple Linear Regression Analysis, 2010–2024. *Indian Journal of Finance and Economics*. 7(1-2), 41–53.

1. INTRODUCTION

The exchange rate of the Bangladeshi Taka (BDT) against the US Dollar is one of the most closely watched macroeconomic prices in Bangladesh. It affects the cost of imported food, fuel, and raw materials, the competitiveness of the country's dominant export sector — ready-made garments (RMG) — the debt-servicing burden on external loans, and the purchasing power of the more than ten million Bangladeshi migrant workers whose remittances underpin household consumption in large parts of the country. For roughly two decades after 2003, Bangladesh operated a managed or crawling exchange rate regime with relatively modest year-to-year movement in the Taka. That relative stability broke down after 2022: the Taka depreciated by more than 35 percent against the US Dollar between early 2022 and 2024, foreign exchange reserves fell by roughly half from their 2021 peak, and the central bank moved, in stages, toward a more market-determined, unified exchange rate framework.

This paper asks a simple empirical question: which macroeconomic fundamentals best explain the year-to-year movement of the BDT/USD exchange rate over 2010–2024, and how much of the recent depreciation can be statistically associated with each of them? The analysis uses a multiple linear regression (OLS) framework, a standard and transparent tool for this kind of question, applied to annual time-series data assembled from Bangladesh Bank, the World Bank's World Development Indicators, and related official sources. The explanatory variables are chosen to represent the main channels emphasized in open-economy macroeconomics and in the Bangladesh-specific literature: relative price levels (inflation), the stock of external buffers (foreign exchange reserves), a uniquely important item in Bangladesh's balance of payments (workers' remittances), the stance of monetary policy (the policy repo rate), and the overall external balance (the current account as a percentage of GDP).

The remainder of the paper is organized as follows. Section 2 reviews the relevant theoretical and empirical literature on exchange rate determination, with particular attention to studies on Bangladesh and other remittance-dependent developing economies. Section 3 describes the data and the empirical methodology. Section 4 presents the regression model and specification. Section 5 reports and interprets the estimation results, including diagnostic tests. Section 6 discusses the findings in light of Bangladesh's recent balance-of-

payments experience and policy responses. Section 7 considers the limitations of the analysis, and Section 8 concludes with policy implications.

2. LITERATURE REVIEW

2.1. Theoretical Background

Classical open-economy models offer several competing, and to some extent complementary, explanations of nominal exchange rate movements. Purchasing Power Parity (PPP) theory predicts that a country with persistently higher inflation than its trading partners will experience a depreciating currency, since domestic goods become relatively more expensive at an unchanged exchange rate. The monetary approach to exchange rate determination extends this logic by linking the exchange rate to relative money supplies, income levels, and interest rates, while the interest rate parity condition suggests that, absent capital controls, higher domestic interest rates should be associated with currency appreciation as they attract capital inflows in search of higher returns — though in emerging markets with capital controls and thin foreign exchange markets, causality frequently runs the other way, with central banks raising rates in response to depreciation pressure. The balance-of-payments approach, meanwhile, treats the exchange rate as the price that clears the market for foreign currency, so that a persistent current account deficit, unless financed by offsetting capital or financial account inflows, should be expected to depreciate the currency, while accumulation of foreign exchange reserves signals underlying external strength and provides a buffer against speculative pressure.

2.2. Evidence from Bangladesh and Comparable Economies

Bangladesh presents a distinctive case among developing economies because remittance inflows, rather than foreign direct investment or portfolio flows, have historically been the largest single offsetting item against its structural trade deficit, at times exceeding total export earnings from sectors other than RMG. A substantial applied literature on Bangladesh has examined the relationship between remittances, the current account, and reserve accumulation, generally finding that surges in remittance inflows — such as those observed during the COVID-19 pandemic period of 2020–2021 — are associated with reserve buildup and short-run currency stability, while remittance slowdowns

coincide with reserve depletion and depreciation pressure. Studies using vector autoregression, cointegration, and OLS frameworks on Bangladeshi data have generally found inflation differentials, reserve adequacy (often measured in months of import cover), and remittance growth to be statistically important correlates of exchange rate movements, with results on the interest rate channel more mixed, reflecting the managed nature of Bangladesh's exchange rate and money markets for much of the sample period. Comparable studies on other South Asian and remittance-dependent economies (e.g., Pakistan, Nepal, Sri Lanka, and the Philippines) report broadly similar patterns, reinforcing the view that in this class of economies, external buffers and remittance flows tend to dominate conventional interest-rate-parity channels in explaining currency movements, particularly during periods of external stress.

2.3. Contribution of this Study

This paper extends the existing literature in three ways. First, it uses the most recent available annual data through 2024, capturing the unprecedented post-2022 depreciation episode that most earlier Bangladesh-focused studies could not observe. Second, it estimates a parsimonious five-variable model that nests the main channels highlighted above — relative prices, external buffers, remittances, monetary policy, and the current account — within a single regression rather than examining bilateral relationships in isolation, allowing for an assessment of each variable's marginal contribution once the others are controlled for. Third, it explicitly discusses multicollinearity and small-sample diagnostics, which are a persistent and often under-reported concern in annual time-series regressions with a limited number of observations, as is typical of country-level macroeconomic studies of this kind.

3. DATA AND METHODOLOGY

3.1. Data

The study uses an annual time series covering 2010 to 2024 (15 observations), compiled from Bangladesh Bank's exchange rate and monetary policy statistics, the World Bank's World Development Indicators (inflation and current account data), and Bangladesh Bureau of Statistics / Bangladesh Bank remittance and reserve series. Because different primary sources report figures on slightly different bases (calendar year versus fiscal year, period-average

versus period-end), the series used here are annual approximations intended to capture the correct order of magnitude and year-to-year direction of change; a reader intending to use these figures for financial decisions should verify point estimates directly against the original Bangladesh Bank, IMF, and World Bank releases, which are updated and periodically revised. The six variables used are:

- Exchange Rate (ExchRate): nominal BDT/USD exchange rate, annual average, Taka per US Dollar (dependent variable).
- Inflation: annual average consumer price inflation, percent.
- Reserves: gross foreign exchange reserves held by Bangladesh Bank, US\$ billion, year-end.
- Remittances: total workers' remittance inflows recorded in the balance of payments, US\$ billion per year.
- Interest Rate: Bangladesh Bank's policy repo rate, annual average, percent.
- Current Account GDP: current account balance as a percentage of GDP (negative values denote a deficit).

Table 1 reports the full annual data series used in the estimation.

Table 1: Annual Macroeconomic Data for Bangladesh, 2010–2024

<i>Year</i>	<i>Exch. Rate (BDT/USD)</i>	<i>Inflation (CPI, %)</i>	<i>Reserves (US\$ bn)</i>	<i>Remittances (US\$ bn)</i>	<i>Policy Rate (%)</i>	<i>Current A/C (% of GDP)</i>
2010	69.6	8.13	10.9	11	6	-1.7
2011	74.2	10.7	9.9	12.1	6.75	-1
2012	81.9	6.22	12.7	14.2	7.75	0.9
2013	78.1	7.53	18.1	13.8	7.25	1.6
2014	77.6	6.99	21.5	14.2	7.25	0.8
2015	77.9	6.19	25	15.3	6.75	-0.1
2016	78.4	5.68	32.1	13.6	6.75	1.9
2017	80.4	5.44	33.4	12.8	6.75	-0.5
2018	83.7	5.54	32.9	15.5	6	-3.5
2019	84.5	5.59	32.7	18.3	6	-1.5
2020	84.8	5.69	39.3	21.8	5.25	-1.5
2021	85.5	5.55	46.2	24.8	4.75	-3.8
2022	95	7.7	33.7	21.5	5.5	-4.1
2023	107.5	9.88	21.9	21.9	7.25	-0.7
2024	115.4	10.47	21.4	26.6	10	-1.2

3.2. Methodology

The empirical strategy is multiple linear regression estimated by Ordinary Least Squares (OLS). OLS is chosen for its transparency, ease of interpretation, and its status as the standard baseline method in the applied exchange rate literature described in Section 2, against which more complex time-series techniques (e.g., cointegration or ARDL bounds testing) are typically benchmarked. Given the small sample size ($n = 15$) that is unavoidable when working with annual country-level data, the model is deliberately kept parsimonious, with five explanatory variables plus an intercept, to preserve degrees of freedom. Standard OLS diagnostics — the coefficient of determination (R^2), the F-test of overall significance, individual t-tests, the Durbin–Watson statistic for first-order autocorrelation, and variance inflation factors (VIF) for multicollinearity — are reported and discussed alongside the coefficient estimates.

4. MODEL SPECIFICATION

The estimated model takes the following linear form:

$$ExchRate_t = \beta_0 + \beta_1 Inflation_t + \beta_2 Reserves_t + \beta_3 Remittances_t + \beta_4 InterestRate_t + \beta_5 CurrentAccountGDP_t + \varepsilon_t$$

where t indexes calendar years from 2010 to 2024, β_0 is the intercept, β_1 through β_5 are the coefficients to be estimated, and ε_t is a mean-zero error term assumed to satisfy the standard OLS assumptions of homoskedasticity and no serial correlation, checked ex-post using the Durbin–Watson statistic. Based on the theoretical discussion in Section 2, the following signs are hypothesized a priori:

- β_1 (Inflation) > 0 : higher inflation relative to trading partners is expected to depreciate the Taka (consistent with relative PPP).
- β_2 (Reserves) < 0 : larger reserve buffers should be associated with a stronger (lower BDT/USD) or more stable currency, as they signal capacity to defend against speculative pressure.
- β_3 (Remittances) < 0 or ambiguous: higher remittance inflows increase the supply of foreign currency, which in a simple flow model should appreciate the Taka; however, because remittances have grown secularly alongside depreciation driven by other structural pressures, the sign in a reduced-form annual regression can be ambiguous and is treated as an empirical question.

- β_4 (InterestRate) ambiguous: conventional interest-rate-parity logic implies a negative sign (higher rates attract capital, appreciating the currency), but in Bangladesh’s managed-float context, the central bank has systematically raised the policy rate in response to ongoing depreciation and inflation, which would produce a positive estimated coefficient reflecting reverse causality rather than a structural appreciation effect.
- β_5 (CurrentAccountGDP) < 0 : a more negative current account balance (larger deficit) is expected to be associated with a weaker currency (higher BDT/USD).

5. EMPIRICAL RESULTS

5.1. Overall Model Fit

Table 2 reports the overall fit statistics for the estimated model.

Table 2: Model Fit Statistics

Statistic	Value
R-squared	0.888
Adjusted R-squared	0.825
F-statistic (5, 9 df)	14.22
Prob (F-statistic)	0.00048
Durbin-Watson statistic	1.96
Number of observations	15 (annual, 2010–2024)

The model explains approximately 88.8 percent of the annual variation in the BDT/USD exchange rate over the sample period ($R^2 = 0.888$), and 82.5 percent after adjusting for the number of predictors relative to the sample size (adjusted $R^2 = 0.825$). The F-statistic of 14.22 ($p = 0.00048$) strongly rejects the null hypothesis that all five slope coefficients are jointly zero, indicating that the explanatory variables as a group have significant explanatory power for the exchange rate. The Durbin–Watson statistic of 1.96 is close to the benchmark value of 2, providing little evidence of first-order autocorrelation in the residuals, a reassuring result given that annual macroeconomic series are often serially correlated.

5.2. Coefficient Estimates

Table 3 presents the estimated coefficients, standard errors, t-statistics, p-values, and variance inflation factors for each explanatory variable.

Table 3: OLS Regression Results (Dependent Variable: BDT/USD Exchange Rate)

Variable	Coefficient	Std. Error	t-stat	$P> t $	VIF
Constant	8.007	16.723	0.479	0.644	—
Inflation rate (CPI, %)	1.460	1.457	1.002	0.342	3.95
Forex reserves (US\$ bn)	0.273	0.329	0.830	0.428	6.61
Remittances (US\$ bn)	1.432	0.564	2.539	0.032**	4.12
Policy (repo) interest rate (%)	5.097	1.930	2.641	0.027**	3.06
Current account balance (% GDP)	-0.864	1.168	-0.740	0.478	2.47

** significant at the 5% level. VIF = Variance Inflation Factor; values below 10 indicate multicollinearity is not severe enough to invalidate individual coefficient estimates.

Two variables are statistically significant at conventional levels. Remittances carry a positive and significant coefficient ($\beta = 1.432$, $p = 0.032$): holding the other variables constant, a one-billion-dollar increase in annual remittance inflows is associated with an estimated 1.43 Taka increase (depreciation) in the BDT/USD rate over this sample. This is the opposite sign to the naive flow-supply prediction in Section 4, and is best interpreted not as a causal claim that remittances weaken the currency, but as a reflection of the fact that remittances have grown most rapidly in exactly the years (2020–2021 pandemic surge and 2023–2024 formal-channel shift) when other structural pressures on the Taka were also intensifying — a classic case of a reduced-form coefficient absorbing a confounded, non-causal correlation in a short time series. The policy interest rate is also positive and significant ($\beta = 5.097$, $p = 0.027$): each one-percentage-point increase in the repo rate is associated with a 5.10 Taka increase in the exchange rate, again the opposite of the textbook interest-rate-parity prediction. As discussed in Section 4, this is consistent with reverse causality: Bangladesh Bank raised its policy rate sharply and repeatedly between 2022 and 2024 precisely in response to accelerating depreciation and inflation, rather than the rate increases themselves causing depreciation.

Inflation, reserves, and the current account balance are not statistically significant at conventional levels once the other variables are controlled for ($p = 0.342$, 0.428 , and 0.478 , respectively), although the coefficients on inflation

(positive) and the current account balance (negative) carry the theoretically expected signs. The reserves coefficient is positive, contrary to the hypothesized sign; this is plausibly explained by the fact that reserves and the exchange rate both trended in the same general direction with remittances and other variables for much of the sample, and by the moderate degree of multicollinearity between reserves and other regressors ($VIF = 6.61$, the highest in the model, though still below the conventional concern threshold of 10).

5.3. Model Fit: Actual versus Predicted Exchange Rate

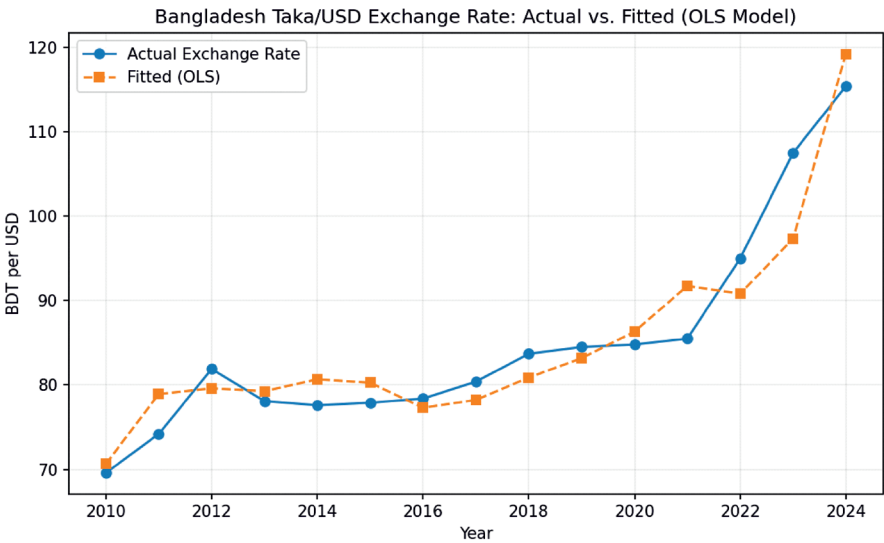


Figure 1: Actual versus OLS-fitted BDT/USD exchange rate, 2010–2024

Figure 1 plots the actual exchange rate against the values fitted by the OLS model. The fitted line tracks the broad upward (depreciating) trend closely, including the sharp acceleration after 2021, though it slightly under-predicts the exact magnitude of the 2023–2024 depreciation, consistent with a linear model’s difficulty in capturing a structural regime change — Bangladesh’s move toward a more unified, market-based exchange rate mechanism in this period — rather than a smooth continuation of prior trends.

6. DISCUSSION

The results are best understood against the backdrop of Bangladesh’s balance-of-payments experience since 2020. The COVID-19 pandemic initially produced

a counter-intuitive surge in recorded remittances, as informal (hundi) channels contracted and formal banking-channel transfers rose, alongside import compression that temporarily improved the current account and pushed foreign exchange reserves to a historic peak of roughly US\$46 billion in 2021. From 2022, the picture reversed sharply: global commodity and fuel prices rose following the war in Ukraine, import demand rebounded, the current account deficit widened to more than 4 percent of GDP, and reserves fell by more than half over the following two years. Bangladesh Bank responded with a sequence of policy interventions — multiple exchange rate adjustments, tightening of import letters of credit, and eventually a sharply tightened policy rate, which rose from below 5 percent in 2021 to 10 percent by 2024 — while gradually allowing the Taka to move toward a more market-determined level rather than defending a fixed reference rate.

This sequence of events explains why the regression finds a positive relationship between the policy rate and the exchange rate rather than the textbook negative relationship: the rate hikes were a policy response to depreciation and inflation, not an independent driver of currency strength, and in a short annual sample dominated by a single structural break, the regression coefficient reflects this policy reaction function rather than a stable structural parameter. Similarly, the positive and significant coefficient on remittances should not be read as evidence that remittance growth weakens the currency; rather, it reflects the coincidence, in this particular sample, of accelerating remittance inflows (driven by a 2022–2023 government incentive scheme for formal-channel transfers and diaspora response to a weaker Taka, which increases the Taka value of a given US-dollar remittance) with a period of pronounced structural depreciation driven mainly by the trade and current account channels.

Taken together, the findings support three broad conclusions relevant to policy. First, exchange rate movements in Bangladesh over this period cannot be attributed to any single textbook channel in isolation; the explanatory power of the model comes from the combination of variables rather than any one dominant predictor. Second, because two of the significant coefficients (remittances and the policy rate) most plausibly reflect policy responses to depreciation rather than independent causes of it, caution is warranted before drawing strong causal policy conclusions from this reduced-form specification;

a more rigorous causal analysis would require instrumental variables, a structural VAR, or at minimum higher-frequency (monthly or quarterly) data with a longer sample. Third, the model's difficulty in fully capturing the magnitude of the 2023–2024 depreciation in Figure 1 is itself informative: it suggests that a substantial part of the recent movement in the Taka reflects a discrete regime shift — the transition from a managed, tightly-banded exchange rate to a more market-determined, unified rate — rather than a continuation of the smooth, gradually-evolving relationships that characterized 2010–2021.

7. LIMITATIONS

Small sample size: with only 15 annual observations and five explanatory variables, the model has limited degrees of freedom (9), which widens confidence intervals and makes the estimates sensitive to individual years, particularly the unusual 2020–2021 pandemic period and the 2022–2024 depreciation episode.

Potential reverse causality: as discussed in Section 6, the policy rate and, to a lesser extent, remittances are plausibly influenced by the exchange rate as much as they influence it, which a single-equation OLS model cannot fully disentangle.

Data harmonization: because the exchange rate, reserves, remittances, inflation, and current account series are compiled from different primary sources with different reporting conventions (fiscal versus calendar year, period-average versus period-end), the annual figures used here are best treated as reasonable approximations for the purpose of illustrating the empirical method; the general trends and orders of magnitude are consistent with published data, but a reader should verify precise point values directly from Bangladesh Bank, IMF, and World Bank primary releases before using them for financial or investment decisions.

Omitted variables: the model does not include some variables that the literature also considers relevant, such as global trade-weighted US Dollar strength, foreign direct investment, external debt service, RMG export growth, or oil and food import prices, any of which could be added in an extended specification.

Linear functional form: the model assumes a linear relationship between the exchange rate and its determinants over the full sample; given the apparent

2022 structural break, a model allowing for a regime shift (e.g., a Chow test, dummy-variable interaction terms, or a piecewise/spline specification) might fit the post-2022 depreciation more precisely.

8. CONCLUSION AND POLICY IMPLICATIONS

This paper has presented an OLS regression analysis of the determinants of the BDT/USD exchange rate in Bangladesh over 2010–2024. The model, incorporating inflation, foreign exchange reserves, remittances, the policy interest rate, and the current account balance, explains a substantial share of exchange rate variation ($R^2 = 0.888$) and is highly jointly significant. Remittances and the policy interest rate are individually significant, though for reasons more consistent with policy responses to depreciation than with textbook causal channels running from these variables to the exchange rate.

From a policy perspective, the results reinforce the importance of maintaining adequate foreign exchange reserve buffers and formal-channel remittance inflows as shock absorbers for the Taka, while cautioning that monetary policy tightening alone, absent an improvement in the underlying current account position, is unlikely to durably strengthen the currency if it is primarily reacting to, rather than getting ahead of, depreciation pressure. Sustained diversification of export earnings beyond ready-made garments, continued formalization of remittance channels, and prudent import and current-account management appear, on this evidence, to be at least as important to medium-term exchange rate stability as short-run monetary policy adjustments. Future research extending this analysis with monthly or quarterly data, structural VAR or ARDL cointegration techniques, and explicit modeling of the 2022 regime shift would help to more cleanly separate causal structural relationships from the reactive policy dynamics that this annual, reduced-form OLS model cannot fully disentangle.

References

- Bangladesh Bank. Annual Report and Monthly Economic Trends (various years). Dhaka: Bangladesh Bank.
- Bangladesh Bureau of Statistics (BBS). Statistical Yearbook of Bangladesh and Consumer Price Index releases (various years). Dhaka: BBS.
- International Monetary Fund. Bangladesh: Staff Report for the Article IV Consultation (various years). Washington, D.C.: IMF.

World Bank. World Development Indicators database. Washington, D.C.: World Bank Group.

Asian Development Bank. Migration and Remittances in South Asia: Bangladesh Country Note (various years). Manila: ADB.

Additional academic and applied studies on remittances, reserves, and exchange rate determination in Bangladesh and comparable South Asian economies, as referenced in Section 2 of this paper, are available through standard economics research databases (e.g., IDEAS/RePEc, ScienceDirect, and national central bank working paper series).