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Macroeconomic Determinants of Manufactured Jute Exports in Bangladesh: An ARDL Bounds Testing Approach

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Abstract: Manufactured jute exports are a critical but understudied source of non-garment foreign exchange for Bangladesh. Grounded in open-economy trade theory, which links export performance to price competitiveness, domestic productive capacity, and external demand, this study examines how the exchange rate, interest rates, manufacturing production index, and world import volume jointly determine manufactured jute export value using 84 monthly observations from January 2019 to December 2025. Integration orders are confirmed through complementary unit root tests, and structural breaks from the COVID-19 pandemic, the Russia-Ukraine conflict, and a domestic interest rate regime change are controlled via step dummy variables. An autoregressive distributed lag (ARDL) bounds testing framework confirms cointegration, complemented by Toda-Yamamoto causality tests for short-run dynamics. World import volume is the sole statistically significant long-run determinant, with an elasticity of 2.903 exceeding unity, while causality runs strictly from the global trade environment to the domestic export sector without feedback. The exchange rate and domestic interest rates carry no discernible long-run influence, and manufacturing production exerts a short-run effect that fully reverses within one period. This study provides the first break-adjusted, multivariate macroeconomic examination of manufactured jute export determinants in Bangladesh, establishing the sector as externally demand-driven and redirecting policy attention from domestic price instruments toward market diversification and product upgrading.

Keywords: Manufactured jute exports, ARDL bounds testing, structural breaks, export determinants, Bangladesh

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1. Introduction

The global economy is undergoing a measurable reorientation toward sustainable materials, with natural fiber industries at the intersection of environmental policy and trade. Islam et al. (2025) document that natural fiber-based goods are gaining traction across fashion, automotive, and construction sectors on the strength of their biodegradability and renewability, with regulatory momentum particularly pronounced in Europe. Yet jute's structural position remains constrained. The United Nations Conference on Trade and Development (UNCTAD, 2025) reports that while jute's volume share in global fiber trade more than doubled between 1996 and 2023, man-made fibers command nearly 70% of total trade value in yarn and fabric, and jute exporters face disproportionate tariff escalation on processed goods alongside a heavier burden of non-tariff measures than synthetic counterparts, confining jute to high-volume, low-value applications.

Bangladesh occupies the center of this dynamic. Rahman et al. (2017) establish that jute historically served as the foundation of the Bangladeshi economy, earning designation as the "Golden Fiber" through its role as the primary foreign exchange earner before the rise of the ready-made garment industry, while retaining contemporary significance as a critical source of non-garment export revenue. Akter et al. (2020) document the scale of this structural transition, with jute's share of total export earnings falling from 89.9% in 1973 to approximately 3.9% by 2009. Compounding pressures identified by Moniruzzaman et al. (2024), including pervasive synthetic competition, Indian market dominance, and outdated manufacturing infrastructure, have further eroded comparative advantage and forced a strategic pivot toward higher-value categories such as geotextiles and technical textiles.

Despite growing empirical attention to the sector, a clear methodological gap persists. Existing studies either assess comparative advantage through static cross-country frameworks, estimate export demand via Ordinary Least Squares (OLS) on annual data without structural controls, or confine dynamic modeling to univariate production forecasting. No study applies a multivariate macroeconomic framework to manufactured jute export value, and none accounts for structural disruptions from the COVID-19 pandemic, the Russia-Ukraine conflict, or Bangladesh Bank's interest rate regime change, each of which plausibly altered the data-generating processes of the relevant series. This study addresses these gaps by employing an ARDL bounds testing framework on 84 monthly observations spanning January 2019 to December 2025, examining how the exchange rate, domestic interest rates, manufacturing production capacity, and world import volume jointly determine manufactured jute export value in Bangladesh. Raw jute exports are excluded, as comparable monthly supply-side data are unavailable to model them. Focusing on manufactured jute also aligns with the sector's pivot toward higher-value processed categories, making it the more policy-relevant unit for a macroeconomic determinants framework. Integration orders are confirmed via the Augmented Dickey-Fuller (ADF) and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) tests and short-run causal relationships via Toda-Yamamoto modified Wald tests. This provides the first break-adjusted, multivariate macroeconomic examination of manufactured jute export determinants in Bangladesh with direct implications for trade policy and monetary strategy.

2. Literature Review

The relationship between exchange rate movements and export performance in developing economies is well-established, though the transmission mechanism is rarely immediate. Bahmani-Oskooee and Ratha (2004) document that while exchange rate adjustments occur instantaneously, the response of producers and consumers is subject to significant lags owing to supply bottlenecks and production constraints, giving rise to the J-curve phenomenon whereby currency depreciation initially worsens the trade balance before export volumes expand sufficiently to generate a net improvement. At the level of export pricing, Dash and Narasimhan (2011) find evidence of incomplete exchange rate pass-through in India, where exporters engage in pricing-to-market behavior to defend their competitive position abroad, a pattern observed in comparable developing economies including Indonesia and the Philippines. By contrast, Abdi and Mohamed (2025) find that currency depreciation strengthens agricultural export competitiveness in Somalia over the long run, with exchange rates, institutional quality, and Foreign Direct Investment (FDI) inflows each causally predicting exports without reverse feedback. Beyond the exchange rate, Sonaglio et al. (2016) demonstrate in the context of Brazil that elevated domestic interest rates attract speculative capital inflows that appreciate the real exchange rate, thereby eroding manufactured export competitiveness. However, this channel operates very differently in managed-exchange-rate economies. Brandao-Marques et al. (2020) establish that monetary policy transmission to output and trade in non-inflation-targeting developing economies is considerably weaker than in advanced peers, with price dynamics more likely driven by commodity and weather shocks than by policy rate adjustments. Roy et al. (2023) reinforce this finding for Bangladesh specifically, demonstrating that monetary policy operates primarily through the bank lending channel, with the exchange rate response to monetary shocks remaining small and statistically insignificant, and that export-oriented firms are partially insulated from domestic monetary conditions through access to international financing.

On the supply side, domestic manufacturing capacity shapes export performance in ways that are not always straightforward. Wan et al. (2022) caution that in commodity-dependent developing economies, expansions in export value can paradoxically undermine industrialization through export-led deindustrialization, whereby comparative advantage in primary goods diverts resources away from manufacturing and can trigger Dutch disease dynamics that crowd out manufactured exports. At the aggregate level, however, global import demand consistently emerges as the dominant determinant of individual country export performance. Morin and Schwellnus (2014) show, across 41 diverse economies, that a long-run unit elasticity exists between a country's export volumes and the weighted import volumes of its trading partners, with volume adjustments to foreign demand shocks completing largely within a single year. This primacy of external demand is corroborated by gravity model evidence from Leitão (2024), who establishes that the economic size and market potential of destination countries are positively and robustly correlated with bilateral trade flows. The export demand elasticity literature adds an important qualification, however: Devarajan et al. (2023) find that trade elasticities for developing countries average below unity for both exports and imports, implying that the income effect dominates the substitution effect in response to global market shocks and rendering developing country exports relatively insensitive to price-based policy levers such as exchange rate depreciation.

The broader macroeconomic environment within which export relationships operate was profoundly reshaped by two successive global shocks during the sample period of this study. Amutabi (2024) documents that the COVID-19 pandemic disrupted global trade flows through simultaneous demand and supply shocks, with lockdown measures and border-clearance delays widening trade deficits in export-dependent developing economies and producing uneven recovery trajectories. Superimposed on the pandemic's legacy, the Russia-Ukraine conflict introduced a distinct and severe commodity price shock. Kosormyhin (2025) demonstrates that the conflict triggered a sharp surge in global fertilizer prices and caused Ukrainian grain and oilseed exports to fall by over 40%, propagating through production and logistics cost structures across developing nations explicitly identified as including Bangladesh, reducing export competitiveness and forcing countries to reshuffle trade partnerships under heightened logistical complexity. For Bangladesh, the conflict-era inflationary environment would plausibly have affected both the cost structure of manufacturing and the purchasing capacity of key export markets, making the Russia-Ukraine shock a structurally relevant episode for modeling jute export dynamics. Taken together, these two episodes underscore that the global demand environment within which Bangladeshi jute exports operate is not a stable backdrop but an active source of structural disruption, reinforcing the methodological necessity of accounting for exogenous shocks in any time-series analysis of export performance. Kiwale et al. (2026) correspondingly apply ARDL bounds testing with structural stability diagnostics to Zambia's China trade relationship, confirming parameter stability across the Global Financial Crisis, the 2015–2016 commodity price collapse, and COVID-19.

Despite a growing body of empirical work on jute sector dynamics in Bangladesh, a clear methodological and substantive gap remains. Existing studies on jute export performance either focus on comparative advantage metrics across nations (Sharna and Kamruzzaman, 2020) or model export demand using static OLS estimation on annual data without accounting for the structural heterogeneity introduced by major macroeconomic disruptions (Asrafuzzaman and Islam, 2021). Studies that do engage with time-series modeling confine themselves to production-side forecasting through Autoregressive Integrated Moving Average (ARIMA) specifications (Yasmin and Moniruzzaman, 2024) or univariate smoothing techniques applied to mill-level output data (Dhali et al., 2023), rather than examining the macroeconomic determinants of export value through a dynamic multivariate framework. None of the extant literature accounts for the structural breaks introduced by the COVID-19 pandemic, the Russia-Ukraine conflict, or the shift in Bangladesh Bank's interest rate policy regime, each of which is likely to have materially altered the data-generating processes of the relevant series. The present study addresses these gaps by employing an ARDL bounds testing framework on monthly data spanning 2019 to 2025, with integration orders confirmed via the ADF and KPSS tests and short-run dynamics supplemented by Toda-Yamamoto Granger causality analysis, providing the first break-adjusted, multivariate macroeconomic examination of manufactured jute export determinants in Bangladesh.

3. Methodology

This study employs monthly time series data spanning January 2019 to December 2025, yielding 84 observations. The dependent variable is the log of Jute Export Value (JUTEX), measured in crore Bangladeshi Taka and sourced from Bangladesh Bank's Monthly Economic Trends. Jute export value only consists of manufactured jute goods; raw jute exports are excluded entirely, as incorporating them would require agricultural supply-side controls such as harvested area, yield, rainfall, and input use, for which comparable monthly data are not reported in Bangladesh. The independent variables comprise four series: the log of the BDT/USD exchange rate (USD), the interest rate (INTR), the log of the Manufacturing Production Index (MPIX), and the log of the World Import Volume Index (WIV). USD, MPIX and INTR are drawn from Bangladesh Bank's Monthly Economic Trends, and WIV is sourced from the CPB World Trade Monitor (see Table 1). All variables are expressed in natural logarithms with the exception of INTR, which enters the model in levels given that interest rates are expressed as percentages and logarithmic transformation is not theoretically appropriate. All series are used in raw, non-seasonally adjusted form, as the ARDL specification's lagged terms absorb seasonal patterns within the estimated dynamics without requiring pre-filtering that could remove information relevant to the long-run level relationship.

Table 1: Overview of Variables

Variable	Name	Unit	Transform	Source
JUTEX	Manufactured Jute Exports	Crore Tk	Log	Bangladesh Bank Monthly Trends
USD	Exchange Rate	BDT/USD	Log	Bangladesh Bank Monthly Trends
INTR	Advance Rate of Scheduled Banks	Percent	Level	Bangladesh Bank Monthly Trends
MPIX	Manufacturing Index	Index	Log	Bangladesh Bank Monthly Trends
WIV	World Import Volume	Index	Log	CPB Trade Monitor

ADF and KPSS tests are estimated to confirm integration orders. The ADF test examines the null hypothesis of a unit root (Dickey & Fuller, 1979) while the KPSS test takes stationarity as the null (Kwiatkowski et al., 1992), such that agreement between them strengthens the reliability of inference. All five variables are confirmed to be integrated of order zero or one, I(0) or I(1), with none found to be I(2), satisfying the precondition for ARDL bounds testing. The sample period encompasses three distinct macroeconomic disruptions, the COVID-19 pandemic, the Russia-Ukraine conflict and its associated global inflationary shock, and a shifting interest rate regime, each of which is likely to have introduced structural breaks into the data generating processes of the series under study. Accordingly, the Zivot-Andrews (ZA) endogenous structural break test (Zivot & Andrews, 1992) is additionally applied across three specifications, intercept only (c), trend only (t), and intercept and trend (ct), to identify the timing of statistically significant breaks in each series. The ZA results identify several break dates clustered around three major macroeconomic periods. Three step dummy variables are constructed accordingly, D2020, D2022, and D2023, each taking the value of one from the identified break date onward and zero otherwise.

Given the confirmed I(0) or I(1) nature of all variables, this study employs the Autoregressive Distributed Lag (ARDL) bounds testing approach to long-run level relationships developed by Pesaran et al. (2001). The ARDL framework was selected for three reasons: it accommodates small sample sizes effectively; it permits the inclusion of structural break dummies as fixed regressors without requiring augmented critical values; it remains valid for identifying long-run level relationships even with mixed integration orders of I(0) and I(1) variables. The general ARDL(p, q_1, q_2, q_3, q_4) specification takes the form:

$$ln\, JUTEX_t = \alpha_0 + \sum_{i=1}^{p} \phi_i \, ln\, JUTEX_{t-i} + \sum_{j=0}^{q_1} \beta_{1j} INTR_{t-j} + \sum_{j=0}^{q_2} \beta_{2j} \, ln\, USD_{t-j} + \sum_{j=0}^{q_3} \delta_j \, ln\, MPIX_{t-j} + \sum_{j=0}^{q_4} \gamma_j \, ln\, WIV_{t-j} + \lambda_1 D2020_t + \lambda_2 D2022_t + \lambda_3 D2023_t + \varepsilon_t \quad (1)$$

where p and q_k $(k=1,\ldots,4)$ denote the lag orders on the dependent variable and each regressor respectively, the λ coefficients attach to the three structural dummies entering as fixed regressors, and ε_t is the error term. An unrestricted constant with no deterministic trend (Case 3 of Pesaran et al., 2001) is imposed throughout. Unit root and structural break tests are conducted in Python; all subsequent estimation is carried out in EViews 13.

The Schwarz Information Criterion (SIC) selects the optimal lag structure from 512 candidate models, yielding an ARDL(1,0,0,1,0) specification. With 83 usable observations (one observation lost to the initial lag), four regressors, and three structural dummies already drawing on a modest pool of degrees of freedom, the maximum lag length is restricted to two for the dependent variable and three for each regressor. The SIC is preferred over the Akaike Information Criterion (AIC) to guard against overparameterization within this constrained sample. This ceiling keeps the largest candidate specification's parameter count well clear of the sample size while still allowing up to a quarter's worth of delayed adjustment in each regressor. Heteroskedasticity and Autocorrelation Consistent (HAC) standard errors with a Bartlett kernel and Newey-West fixed bandwidth of four are applied throughout. The bounds test of Pesaran et al. (2001) tests the null of no long-run level relationship via a joint F-statistic on the lagged level terms and a t-statistic on the lagged dependent variable. Critical values bound the test for purely I(0) and I(1) regressors, preserving validity under mixed integration orders. Rejection of the null confirms cointegration, after which the ARDL is reparametrized as an Error Correction Model (ECM) to recover short-run dynamics and the speed of adjustment to equilibrium. Model adequacy is assessed via the Breusch-Godfrey, Breusch-Pagan-Godfrey, Jarque-Bera, and RESET tests, with parameter stability evaluated through Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) tests on the recursive residuals.

To examine dynamic interdependencies beyond the long-run framework, a Vector Autoregression (VAR) in levels is estimated following Toda and Yamamoto (1995). The procedure augments the system with dmax additional lags beyond the true lag order k, where dmax is the maximum order of integration confirmed among the variables, yielding a total augmented lag order of p = k + dmax. These extra lags absorb the non-standard distributions induced by unit roots, ensuring the Modified Wald (MWALD) statistic on the first k lag coefficients retains a standard chi-squared distribution without requiring pretesting for cointegration. Given dmax = 1, the optimal lag of one is augmented by one additional lag, yielding a stable system with total lag length p = 2. The endogenous lag structure is restricted to the optimal lag k = 1, while the additional dmax lag of each endogenous variable is entered as a fixed exogenous regressor alongside the constant and the three structural dummies, following the implementation of Dolado and Lütkepohl (1996).

4. Results

Prior to ARDL estimation, multicollinearity among the regressors is assessed via the Variance Inflation Factor (VIF), with all values remaining below the conventional threshold of 10 often associated with severe multicollinearity. O'Brien (2007) shows that this rule of thumb is frequently misapplied, and that even high VIF values do not by themselves undermine regression estimates or warrant corrective action. Furthermore, the ARDL specification adopted in this study incorporates lagged dependent and independent variables, which, as Kripfganz and Schneider (2023) note, purges the error term of serial correlation and preserves the validity of conventional asymptotic inference even in the presence of nonstationary regressors, reinforcing that the modest VIF values reported in Table 2, alongside the descriptive statistics, pose no threat to the reliability of the estimated coefficients.

Table 2: Descriptive Statistics and Multicollinearity Analysis

Variable	**Mean**	**Max.**	**Min.**	**Std. Dev.**	**Skewness**	**Kurtosis**	**VIF**
JUTEX	2.7806	2.9619	2.444	0.0884	-0.7861	4.6694	NA
USD	1.9891	2.0895	1.924	0.0651	0.3909	1.4517	6.002
INTR	9.0317	12.16	7.08	1.8774	0.5324	1.7379	2.896
MPIX	2.2574	2.3971	1.9678	0.084	-0.8101	3.4657	7.247
WIV	2.0033	2.0426	1.9042	0.0261	-1.3677	5.9995	4.524

Note: Statistics are reported for the log-transformed series, except INTR, which enters in levels. VIF values are obtained by regressing JUTEX on the four regressors via OLS in EViews 13.

Unit root tests are conducted using the ADF test at levels (constant and constant-with-trend) and at first differences (constant), complemented by the KPSS test at levels under both specifications (constant and trend) in Table 3. JUTEX is found to be stationary at levels under both ADF specifications and is confirmed trend-stationary when the KPSS trend specification is considered, classifying it as I(0). USD and INTR are non-stationary at levels across all specifications and attain stationarity only upon first differencing, classifying both as I(1). MPIX and WIV yield mixed signals at levels: for MPIX, the ADF trend specification indicates stationarity while both KPSS specifications reject it; for WIV, the ADF trend specification offers only marginal evidence at the 10% level and the KPSS results are themselves divided. Both series nonetheless achieve unambiguous stationarity at first difference and are accordingly treated as I(1). The results thus confirm a mixture of I(0) and I(1) variables, which is consistent with the application of the ARDL bounds testing framework.

Table 3: Unit Root Tests

Variable	**ADF Level (C)**	**ADF Level (C+T)**	**ADF 1st Diff. (C)**	**KPSS Level (C)**	**KPSS Level (T)**	**Order of Integration**
JUTEX	-4.015***	-4.950***	-11.316***	0.775***	0.07	I(0) / TS
USD	0.165	-1.943	-5.507***	1.391***	0.286***	I(1)
INTR	-0.068	-1.075	-6.477***	0.669**	0.351***	I(1)
MPIX	-2.151	-4.666***	-11.038***	1.342***	0.204**	I(1) / TS
WIV	-1.192	-3.196*	-7.394***	1.058***	0.073	I(1) / TS

Note: Significance: *** p<0.01, ** p<0.05, * p<0.10. TS refers to Trend-Stationary.

The Zivot-Andrews (ZA) test detects significant structural breaks in JUTEX, MPIX, and INTR, at the 1% or 5% level, with break dates clustering around episodes in 2020, 2022, and 2023. Three step dummies are accordingly included in the model to control for these shocks, with their construction guided by both the statistical break evidence and theoretical coherence.

D2020, equal to one from March 2020 onward. Two ZA breaks cluster near March 2020, but neither is statistically significant. The significant breaks instead fall slightly later, at May 2020 and October 2020. March 2020 is retained as the dummy's start date on theoretical grounds: it marks the onset of the COVID-19 pandemic and the initiation of strict nationwide lockdown measures in Bangladesh (Akanda and Ahmed, 2020), and precedes the significant May and October breaks closely enough that a single step dummy beginning in March absorbs the subsequent shift in each series.

D2022, equal to one from March 2022 onward, accounts for the commodity price and financial market volatility triggered by the Russia-Ukraine conflict. The invasion began in February 2022, and JUTEX registers a significant break exactly one month later, in March 2022, under both the intercept-only and intercept-and-trend specifications. This lag is consistent with the time needed for global commodity and shipping shocks to pass through to Bangladesh's export sector (Steinbach, 2023), and the dummy's start date is exactly aligned with the ZA-identified break.

D2023, equal to one from November 2023 onward, corresponds to Bangladesh Bank's adoption of a new interest rate framework (IMF, 2024; The Daily Star, 2023). INTR records a significant break at precisely this date under the intercept-only specification, exactly aligning the dummy with the ZA-identified break (see Table 4).

Table 4: Structural Break Tests

Variable	ZA Test (C)	Break Date	ZA Test (T)	Break Date	ZA Test (C+T)	Break Date
JUTEX	-5.605***	2022-03	-5.049***	2020-10	-5.569**	2022-03
USD	-4.208	2022-05	-2.301	2020-09	-3.571	2022-05
INTR	-5.172**	2023-11	-3.394	2022-07	-3.569	2020-03
MPIX	-5.713***	2020-10	-5.439***	2022-12	-6.003***	2020-05
WIV	-3.621	2020-10	-3.531	2020-03	-4.926*	2020-06

Note: Significance: *** p<0.01, ** p<0.05, * p<0.10

The ARDL model is estimated over 83 observations spanning February 2019 to December 2025, with one observation lost to the initial lag. Given the relatively modest sample of 84 months and the inclusion of three dummy variables, the Schwarz information criterion is preferred over the AIC to guard against overparameterization, and HAC standard errors are applied throughout. The SIC selects an ARDL(1,0,0,1,0) specification from a candidate set of 512 models. In the short run, MPIX enters significantly at both the contemporaneous and first-lagged levels, with coefficients of 0.708 and -0.830 respectively, indicating that the positive contemporaneous pass-through from manufacturing production is partially reversed within one period. WIV is positive and significant, suggesting that global demand exerts an upward short-run pressure on JUTEX. By contrast, INTR and USD are statistically insignificant, implying limited short-run sensitivity of the index to domestic interest rates and the exchange rate. Among the structural dummies, D2022 is marginally significant at the 10 percent level, while D2020 and D2023 do not attain conventional significance in the short run (see Table 5).

Table 5: ARDL Short Run

Variable	Coefficient	Std. Error	t-Statistic	Prob.
JUTEX(-1)	0.4852	0.0777	6.2448	0.0000
INTR	0.0046	0.0068	0.6725	0.5034
USD	0.3998	0.3844	1.0403	0.3016
MPIX	0.7076	0.2121	3.3357	0.0013
MPIX(-1)	-0.8301	0.1942	-4.2734	0.0001

WIV	1.4947	0.4253	3.5145	0.0008
D2020	0.0401	0.0287	1.3984	0.1662
D2022	-0.0552	0.0305	-1.8093	0.0745
D2023	-0.0331	0.0201	-1.6438	0.1045
C	-2.1163	0.9142	-2.3148	0.0234

The bounds test yields an F-statistic of 7.484 and a t-statistic of -5.196, both exceeding their respective upper critical bounds at the one percent significance level. The test is conducted under Case 3 of Pesaran et al. (2001), imposing an unrestricted constant with no deterministic trend, which is appropriate given the absence of a prior expectation of a linear trend in the level of manufactured jute export value over the sample period. With four regressors and a sample of 83 observations, the critical value bounds are applicable without size distortion, and the dual rejection criterion, requiring that both the F-statistic on the joint significance of the lagged level terms and the t-statistic on the lagged dependent variable independently exceed their upper bounds, provides stronger evidence of a level relationship than either test alone. This conclusively rejects the null hypothesis of no long-run relationship, confirming cointegration among the variables regardless of their mixed orders of integration (see Table 6).

Table 6: Bounds Test

Test	**Statistic**	**10% Bounds**		**5% Bounds**		**1% Bounds**	
		I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
F-statistic	7.484	2.548	3.644	3.010	4.216	4.096	5.512
t-statistic	-5.196	-2.570	-3.660	-2.860	-3.990	-3.430	-4.600

The long-run estimates reveal that only WIV exerts a statistically significant effect on JUTEX, with a coefficient of 2.903 significant at the five percent level. This implies that a one percent increase in WIV is associated with a 2.903 percent increase in JUTEX over the long run, suggesting that the index is meaningfully responsive to external market conditions. INTR, USD, and MPIX do not attain significance, indicating that domestic interest rates, the exchange rate, and manufacturing production lack a discernible long-run influence on JUTEX over the sample period (see Table 7).

Table 7: ARDL Long Run

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
INTR	0.0089	0.0233	0.3793	0.7054
USD	0.7767	0.8299	0.9359	0.3522
MPIX	-0.2380	0.5410	-0.4398	0.6613
WIV	2.9034	1.2308	2.3589	0.0208

The error correction term is negative and highly significant, with a coefficient of -0.515, indicating that approximately 51.5 percent of any monthly deviation from the long-run equilibrium is corrected within one month. This confirms a stable and moderately fast adjustment process. Among the regressors, WIV remains significant at the five percent level, consistent with the short-run findings, while Δ(MPIX) is also significant, reinforcing the contemporaneous monthly influence of manufacturing production changes on JUTEX. INTR, USD, and the lagged MPIX term remain insignificant, and the dummy variables collectively retain their earlier patterns, with D2022 showing only marginal significance at the ten percent level (see Table 8).

Table 8: Error Correction Model

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
ECT(-1)	-0.5148	0.0991	-5.1961	0.0000

INTR	0.0046	0.0121	0.3773	0.7071
USD	0.3998	0.4096	0.9762	0.3322
MPIX(-1)	-0.1225	0.2692	-0.4550	0.6504
WIV	1.4947	0.5732	2.6075	0.0111
Δ (MPIX)	0.7076	0.2218	3.1904	0.0021
D2020	0.0401	0.0304	1.3162	0.1922
D2022	-0.0552	0.0327	-1.6881	0.0957
D2023	-0.0331	0.0436	-0.7592	0.4502
C	-2.1163	1.0588	-1.9988	0.0494

The model passes all standard diagnostic checks at the conventional 5% threshold. The Breusch-Godfrey test finds no evidence of serial correlation, and the Breusch-Pagan-Godfrey test confirms homoskedasticity, with both returning p-values well above conventional threshold. The Jarque-Bera test supports normality of the residuals, and the RESET test yields a p-value of 0.071, indicating mild evidence of functional form misspecification at the 10% level but not at the usual 5% threshold (see Table 9). Given the small sample and the presence of structural dummies, this result is not considered indicative of serious misspecification. Parameter stability is further confirmed as both the CUSUM and CUSUMSQ statistics remain within the five percent critical bounds throughout the sample period, as shown in Figure 1.

Table 9: Diagnostics

Test	**Test Name**	**Statistic**	**Value**	**p-value**
Serial Correlation	Breusch-Godfrey	F-stat	0.214	0.808
Heteroskedasticity	Breusch-Pagan-Godfrey	F-stat	0.592	0.799
Model Specification	Ramsey RESET	F-stat	3.368	0.071
Normality	Jarque-Bera	JB	0.608	0.738

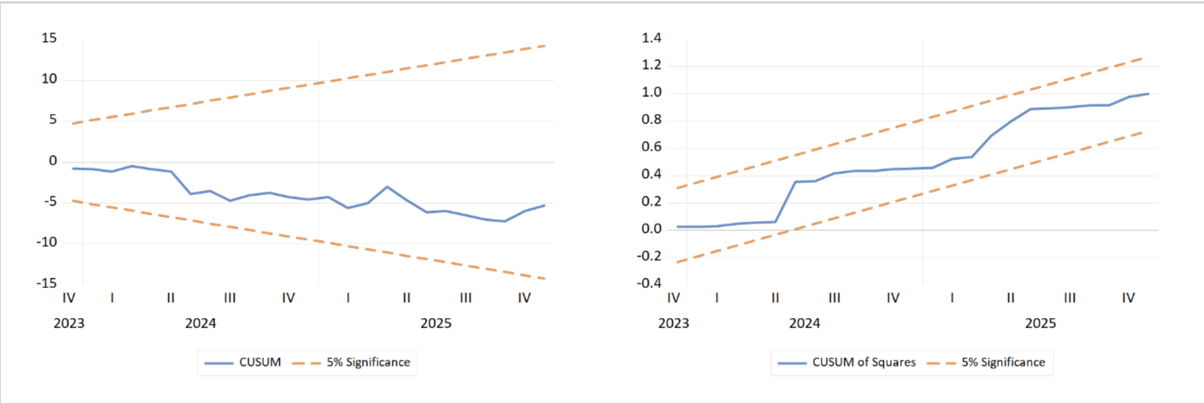

Figure 1: Stability Plots

The optimal lag order k is determined via standard VAR lag order selection criteria applied to the levels VAR comprising JUTEX, USD, INTR, MPIX, and WIV, with the three structural dummies entered as exogenous controls. As reported in Table 10, the Likelihood Ratio (LR), Final Prediction Error (FPE), AIC, SIC, and Hannan–Quinn (HQ) criteria unanimously select a lag order of one, providing unambiguous evidence in favor of k = 1. Combined with the maximum order of integration of dmax = 1 confirmed in Table 3, the augmented lag order is set at p = k + dmax = 2, in line with the Toda-Yamamoto procedure in the Methodology. The resulting model is estimated with the endogenous lag structure restricted to k = 1, while the additional lag of each endogenous variable enters as a fixed exogenous regressor, providing the basis for the MWALD Granger non-causality tests reported in Table 11.

Table 10: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SIC	HQ
0	611.4494	NA	2.16E-13	-14.9734	-14.3735	-14.7331
1	943.2019	587.9159*	9.21E-17*	-22.7393*	-21.3896*	-22.1986*
2	963.9954	34.2171	1.04E-16	-22.6328	-20.5333	-21.7917
3	981.0168	25.8553	1.31E-16	-22.4308	-19.5815	-21.2893
4	996.0936	20.9930	1.77E-16	-22.1796	-18.5804	-20.7377
5	1012.4211	20.6677	2.39E-16	-21.9600	-17.6110	-20.2177

The results of the MWALD Granger non-causality tests are reported in Table 11. WIV emerges as the dominant causal driver of JUTEX, with a chi-square statistic of 16.962 significant at the one percent level, while MPIX also Granger-causes JUTEX at the five percent level and INTR at the ten percent level. Neither JUTEX nor any other variable is found to Granger-cause USD or INTR, indicating that both the exchange rate and the domestic interest rate behave as weakly exogenous with respect to the remainder of the system. WIV additionally Granger-causes MPIX at the one percent level, and INTR Granger-causes WIV at the one percent level, while JUTEX is not found to Granger-cause any other variable in the system, confirming the absence of feedback from the export sector back into its own determinants. Taken together, these results point to a causal structure in which external and manufacturing-side conditions transmit to the export sector without feedback, consistent with the long-run findings reported above.

Table 11: Toda-Yamamoto Granger Causality

Causal variable	Direction	Dependent variable	Chi-square	Prob.
USD	→	JUTEX	0.6319	0.4267
INTR	→	JUTEX	3.0422	0.0811
MPIX	→	JUTEX	4.9145	0.0266
WIV	→	JUTEX	16.9618	0.0000
JUTEX	→	USD	1.4238	0.2328
INTR	→	USD	0.0018	0.9666
MPIX	→	USD	0.8253	0.3636
WIV	→	USD	2.6389	0.1043
JUTEX	→	INTR	0.7704	0.3801
USD	→	INTR	1.2246	0.2685
MPIX	→	INTR	0.0259	0.8722
WIV	→	INTR	0.5943	0.4408
JUTEX	→	MPIX	0.0749	0.7843
USD	→	MPIX	0.0138	0.9064
INTR	→	MPIX	2.1680	0.1409
WIV	→	MPIX	8.5897	0.0034
JUTEX	→	WIV	1.3478	0.2457
USD	→	WIV	0.7581	0.3839
INTR	→	WIV	8.7901	0.0030
MPIX	→	WIV	0.2386	0.6252

5. Discussion

The dominant finding of this study is that world import volume governs manufactured jute export value in Bangladesh across both the long-run level relationship and the direction of causal influence. The long-run multiplier for WIV stands at 2.903 ($p = 0.021$), a coefficient that materially exceeds unity and implies that manufactured jute exports are more than proportionally sensitive to global trade conditions. This corroborates and extends the unit elasticity documented by Morin and Schwellnus (2014) across 41 diverse economies to a highly specialized commodity sector in a small open economy, and aligns with the gravity model evidence of Leitão (2024) establishing that the import absorption capacity of destination markets is a robust structural determinant of bilateral trade flows. The Toda-Yamamoto test yields a chi-square statistic of 16.962 ($p < 0.001$), confirming genuine short-run predictive content rather than a spurious level association produced by the bounds test alone. Critically, the causality is strictly unidirectional: JUTEX does not Granger-cause WIV, establishing Bangladesh's manufactured jute export sector as a price-taker embedded within global trade conditions with no discernible feedback to the international environment. The additional finding that WIV Granger-causes MPIX (chi-square = 8.590, $p = 0.0034$) reveals that domestic manufacturing activity is itself activated by global demand rather than operating as an autonomous supply-side force, completing a demand-pull architecture in which external conditions are the primary organizing mechanism propagating through trade volumes to production and, ultimately, to export value.

The exchange rate results present a consistent picture of neutrality across both estimation horizons, which contrasts with Abdi and Mohamed (2025), who find that currency depreciation strengthens agricultural export competitiveness in Somalia over the long run. The contemporaneous USD coefficient is statistically insignificant in the short run (0.400, $p = 0.302$), and the long-run multiplier likewise fails to attain significance (0.777, $p = 0.352$). This is consistent with the pricing-to-market behavior documented by Dash and Narasimhan (2011) in comparable developing economy export contexts, whereby exporters absorb currency fluctuations into their margins rather than transmitting them into foreign currency prices, defending market share at the cost of short-run profitability. This dynamic is further constrained by Bangladesh's managed exchange rate regime, which limits the amplitude and persistence of BDT/USD movements and thereby reduces the scope for meaningful pass-through to export prices. The theoretical grounding is reinforced by Devarajan et al. (2023), whose finding that trade elasticities in developing countries fall below unity implies that the income effect dominates the substitution effect in response to relative price changes, rendering exchange rate depreciation structurally ineffective as a driver of sustained manufactured export gains. This neutrality is corroborated at the causal level as well: the Toda-Yamamoto results show that USD does not Granger-cause JUTEX (chi-square = 0.632, $p = 0.427$), completing a consistent pattern across the short-run, long-run, and causal dimensions of the analysis. Deliberate currency policy is therefore unlikely to generate durable competitive gains for the sector.

The interest rate results are equally consistent with decoupling from domestic monetary conditions. INTR is statistically insignificant in both the short run (0.005, $p = 0.503$) and the long run (0.009, $p = 0.705$), indicating that the domestic rate environment carries no discernible influence on manufactured jute export value over the sample period. This aligns with Roy et al. (2023), who demonstrate that export-oriented firms in Bangladesh are partially insulated from domestic monetary conditions through access to international financing, and with Brandão-Marques et al. (2020), who establish that monetary policy transmission to trade in non-inflation-targeting developing economies operating under managed exchange rates is considerably weaker than in advanced peers. The interest rate-to-export competitiveness channel identified by Sonaglio et al. (2016), whereby elevated rates attract capital inflows that appreciate the real exchange rate and erode manufactured exports, does not appear to operate in Bangladesh's context, where the managed exchange rate regime forecloses the appreciation mechanism and export-oriented firms' access to international financing severs the link between domestic borrowing costs and export supply. The step dummy D2023 captures the level shift associated with Bangladesh Bank's transition to an interest rate corridor framework in late 2023 without attributing explanatory power to the rate variable itself, which retains a near-zero and insignificant coefficient throughout. The interest rate environment is therefore neither a facilitating nor a constraining force for jute export performance across the estimation horizon. The Toda-Yamamoto result that INTR Granger-causes WIV (chi-square = 8.790, $p = 0.003$) most plausibly reflects a common response to global macroeconomic conditions, whereby Bangladesh Bank's rate adjustments and world import volumes are jointly driven by the same underlying commodity price and inflation cycles, rather than a genuine causal channel running from domestic monetary policy to global trade flows.

The manufacturing production index exhibits short-run activation without long-run persistence. The contemporaneous MPIX coefficient is positive and significant (0.708, $p = 0.001$), followed by a near-equal reversal in the subsequent period (-0.830, $p < 0.001$), while the long-run multiplier is indistinguishable from zero (-0.238, $p = 0.661$). Production shocks thus propagate into export value within one month but dissipate in the following period, leaving no durable imprint on the long-run level of exports. This pattern is consistent with Wan et al.'s (2022) observation that in commodity-dependent developing economies, manufacturing capacity is structurally constrained from functioning as an autonomous driver of sustained export value growth, as comparative advantage configurations and resource allocation pressures limit the degree to which output expansions translate into lasting export gains. This short-run activation is corroborated causally: MPIX Granger-causes JUTEX at the five percent level (chi-square = 4.915, $p = 0.027$), lending formal causal support to the contemporaneous ARDL coefficient rather than resting on coefficient significance alone. Furthermore, the finding that WIV Granger-causes MPIX further subordinates the domestic production environment to the external demand context: the supply side carries explanatory power for month-to-month variation in jute exports but does not operate as the autonomous engine of long-run performance.

The structural dummies offer additional context. D2022 is marginally significant and negative (-0.055, $p = 0.075$), consistent with Kosormyhin's (2025) documentation of elevated production and logistics costs propagating through developing economies following the onset of the Russia-Ukraine conflict, though the modest magnitude suggests absorption of these pressures rather than a structural rupture in export value. D2020 and D2023 do not attain conventional significance, indicating that neither the initial COVID-19 disruption nor the interest rate regime change produced a statistically detectable mean-level shift in manufactured jute export value. The error correction coefficient of -0.515 ($p < 0.001$) confirms that approximately half of any monthly deviation from the long-run equilibrium is corrected within one period, reflecting a stable and moderately fast adjustment process consistent with a well-integrated export market. Taken together, the findings characterize Bangladesh's manufactured jute export sector as one governed overwhelmingly by external demand conditions, with domestic monetary and exchange rate variables playing no discernible long-run role. This asymmetry should orient sector strategy toward deepening market access and advancing product diversification in destination markets experiencing regulatory momentum toward natural fiber alternatives, rather than toward domestic price-based instruments whose long-run efficacy the present evidence does not support.

6. Policy Implications

The findings establish a clear asymmetry with direct policy implications. World import volume is the sole long-run determinant of manufactured jute export value, with an elasticity of 2.903 ($p = 0.021$) that materially exceeds unity, and causality runs strictly from the international trade environment to the domestic sector without discernible feedback. Domestic monetary conditions and the exchange rate carry no statistically detectable long-run influence, consistent with the managed exchange rate regime and export-oriented firms' partial insulation from domestic borrowing costs documented by Roy et al. (2023).

This evidence base precludes price-based instruments as durable policy levers and redirects attention toward a two-tiered strategy: strengthening domestic supply-side absorptive capacity, and actively positioning manufactured jute within the international markets where structural demand is expanding.

Domestically, the priority is converting the contemporaneous sensitivity of exports to manufacturing activity into a durable capability. The Manufacturing Production Index exerts a significant positive short-run effect on export value (0.708, $p = 0.001$) that fully reverses within one period and leaves no long-run imprint, a pattern consistent with infrastructural and institutional constraints that prevent output expansions from generating sustained export gains. Portugal-Perez and Wilson (2012) establish that investment in physical infrastructure and regulatory reform are the most effective levers for improving export performance in lower-income developing economies, with hard and soft infrastructure exhibiting complementarity such that returns to either in isolation are diminished. Institutional reform of the Bangladesh Jute Mills Corporation (BJMC) is equally necessary, as BJMC remains burdened by outdated machinery, administrative inefficiency, and operating losses arising partly from above-market raw jute procurement costs (Kabir et al., 2019). Grumiller et al. (2018) reinforce that sustainable sectoral development requires a coherent industrial strategy rather than fragmented interventions, with priority given to Free on Board (FOB) capacity development, product upgrading, and access to investment capital for technology adoption. Given that INTR and USD carry no long-run efficacy, resources allocated toward domestic interest rate or currency management would not advance the sector's structural objectives.

Internationally, an elasticity exceeding unity implies that the highest-return policy is positioning manufactured jute within markets where import demand is growing structurally rather than cyclically. The current geographic concentration is a source of systemic vulnerability, as the top five destinations account for approximately 62 percent of export earnings weighted heavily toward price-sensitive markets (Kabir et al., 2019). The Toda-Yamamoto result that WIV Granger-causes domestic manufacturing activity (chi-square = 8.590, $p = 0.0034$), alongside Berman et al.'s (2015) evidence that exogenous foreign demand expansions feed positively into domestic production, establishes that diversification into higher-value destination markets carries a dual dividend for both export revenue and manufacturing capacity utilization. The most consequential opportunity lies in automotive and technical textiles: the global automobile sector requires approximately 100,000 tonnes of jute annually while Bangladesh supplies only 12,000 tonnes, representing potential revenues of USD 5 to 7 billion per annum (Kabir et al., 2019). Rahaman and Moshwan (2025) document that leading manufacturers are increasingly integrating natural fibers into components on environmental grounds, a trajectory reinforced by regulatory momentum in the European Union toward biodegradable materials. Parallel engagement with preferential tariff frameworks and reduction of the tariff escalation on processed jute goods identified by UNCTAD (2025) would address the structural market access barriers that the present evidence identifies as the binding constraint on long-run export performance.

7. Conclusions

This study provides the first break-adjusted, multivariate macroeconomic examination of manufactured jute export determinants in Bangladesh, addressing a gap in a literature dominated by static comparative advantage metrics, annual demand models, and univariate production forecasts. Using 84 monthly observations from January 2019 to December 2025, an ARDL bounds testing framework with structural break controls confirms cointegration and identifies world import volume as the sole statistically significant long-run determinant of manufactured jute export value, with an elasticity of 2.903 exceeding unity. Causality runs strictly from the global trade environment to the domestic export sector, and world import volume further Granger-causes domestic manufacturing activity, completing a demand-pull architecture in which external conditions are the primary organizing mechanism. The exchange rate and domestic interest rates carry no discernible long-run influence, consistent with Bangladesh's managed exchange rate regime and the partial insulation of export-oriented firms from domestic borrowing costs through international financing. Manufacturing production exerts a positive contemporaneous effect that fully reverses within one period, confirming that structural constraints prevent output expansions from generating durable export gains.

These findings carry a clear implication for sectoral strategy. Because the binding constraint on long-run export performance is the absorption capacity of destination markets rather than domestic price conditions, the highest-return interventions are those that expand market access and advance product diversification. The structural gap in automotive and technical textiles, where global demand substantially exceeds Bangladesh's current supply, represents the most consequential near-term opportunity, particularly as regulatory momentum in major importing economies toward biodegradable materials continues to strengthen the structural case for natural fiber substitution.

Several limitations bound the scope of these conclusions. The sample period, though sufficient for reliable ARDL estimation at 84 monthly observations, is constrained by the availability of the Manufacturing Production Index, which is not reported by Bangladesh Bank prior to January 2019, preventing extension of the analysis further back in time and limiting the number of full economic cycles captured within the estimation window. The analysis is further limited by its reliance on economy-wide macroeconomic aggregates rather than firm-level or sector-specific variables: the manufacturing production index employed is economy-wide rather than jute-specific, which may attenuate the estimated supply-side relationship, and no mill-level output, firm-level pricing, or jute-specific input cost data are incorporated, each of which could sharpen the precision of the supply-side estimates. The findings also reflect an institutional context particular to Bangladesh's managed exchange rate and export financing arrangements, which may limit generalizability to economies operating under more market-determined exchange rate regimes. Future research could extend the framework to bilateral trade flows, disaggregate by product category or firm size, or apply non-linear threshold models to examine whether the global demand elasticity varies systematically across trade cycle phases.

Declarations

Ethics and Guidelines: Not applicable. This study used publicly available secondary data and did not involve human participants, human data, human tissue, or animals.

Consent to participate: N/A.

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Declaration of using generative AI: During the preparation of this work the author(s) used ChatGPT in order to correct the grammatical errors. After using this tool/service, the author(s) reviewed and edited the content as needed and take full responsibility for the content of the published article.

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