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Economic Relations between Bangladesh and Spain: An Empirical Analysis of Trade, Demographics, and Sectoral Growth (2000-2025)

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Abstract

This study evaluates the bilateral economic corridor between Bangladesh and Spain (2000–2025). Using an augmented gravity model with HAC standard errors, results reveal that Bangladesh's export volume is highly elastic with respect to domestic GDP growth ($\beta = 2.20$) and decoupled from Spanish business cycles. Structural break analysis shows that post-2013 compliance reforms increased buyer trust, although growth elasticity is maturing. Building on evidence from sustainable finance, the paper argues that after Bangladesh's LDC graduation in 2029, high-transparency ESG lending will be essential to meet EU requirements. The strategic recommendations, therefore, emphasize industrial upgrading and export diversification to sustain this important economic partnership.

Keywords: Bilateral trade, Augmented gravity model, LDC graduation, ESG compliance, Sustainable lending, Spain-Bangladesh relations.
JEL Classification: F13, F14, F22, G21, C22.

1.0. Introduction

The bilateral economic relationship between Bangladesh and Spain provides a compelling example of asymmetric integration between an advanced, capital-intensive European economy and a labor-abundant emerging economy in South Asia. Since diplomatic relations were established in 1972, and especially after the opening of the Spanish Embassy in Dhaka in 2008, commercial ties have expanded rapidly. Spain is now the fourth-largest destination for Bangladeshi exports, which total approximately USD 3 billion annually. Spanish exports to Bangladesh, however, remain far smaller, at roughly USD 200 million per year. The result is a pronounced and persistent trade surplus in Bangladesh's favor.

This pronounced imbalance in bilateral trade is explained largely by the dominance of the Ready-Made Garment (RMG) sector, which accounts for more than 90 percent of total trade between the two countries. Its expansion has been closely linked to the preferential market access granted under the European Union's Everything-But-Arms (EBA) initiative. By eliminating tariff barriers, the scheme allowed Bangladeshi producers to integrate more deeply into global apparel supply chains and to respond more effectively to the large-scale sourcing requirements of Spanish retailers.

Yet this model of economic integration is now nearing a critical turning point. Bangladesh is expected to graduate from Least Developed Country (LDC) status in 2029. Although this marks an important development achievement built over the past two decades, it will also bring an end to EBA trade preferences and require a strategic adjustment to the more demanding GSP+ framework.

This transition is unfolding at a moment when European regulatory expectations and consumer demands are changing in ways that directly affect external suppliers. Environmental, Social, and Governance (ESG) criteria are no longer viewed simply as voluntary expressions of corporate responsibility; they are increasingly becoming part of the conditions that shape commercial access and buyer selection. In this broader regulatory context, the European Union's Carbon Border Adjustment Mechanism (CBAM) signals a more demanding climate policy environment for exporters and a broader shift toward carbon accountability in cross-border trade. To remain competitive in the Iberian market, Bangladeshi producers will need not only to absorb rising environmental compliance costs but also to accelerate industrial upgrading through transparent, credible, and well-structured sustainable finance.

The main objective of this study is to provide an empirical assessment of the forces that have shaped this trade corridor over the 2000–2025 period. Drawing on an augmented gravity model, the analysis explores the extent to which macroeconomic frictions, demographic scale, and structural policy shifts have influenced bilateral trade volumes.

The rest of the article is organized as follows. Section 2 reviews the relevant literature on classical trade theory, the gravity model, and sustainable finance. Section 3 outlines the methodology and econometric strategy. Section 4 presents and discusses the empirical findings, including the sequence of regression models and the main macroeconomic trends. Section 5 concludes with the study's main implications and policy recommendations for the post-graduation period.

2.0. Review of Related Literature

Understanding the Bangladesh–Spain trade corridor requires bringing together insights from classical trade theory, spatial econometrics, and institutional development. Earlier studies of trade between advanced European economies and emerging South Asian markets tended to emphasize static comparative advantage and the friction imposed by distance. The contemporary trade environment, however, is more layered and demands a broader analytical lens. Recent scholarship suggests that trade flows are shaped not only by labor-cost differentials and geography, but also by the configuration of global value chains, the growing centrality of regulatory compliance, and the capacity of exporting economies to remain resilient under macroeconomic stress.

What distinguishes this case from earlier studies of North-South trade is that the standard variables—distance, GDP, and factor endowments—explain far less than the institutional architecture surrounding them. Preferential access, compliance regimes, and the organization of global supply chains have shaped this corridor more decisively than geography ever could. The literature reviewed below develops each of these dimensions in turn and, in doing so, reveals a set of analytical gaps that the empirical analysis in Section 3 is designed to address.

2.1. Classical and New Trade Theories in Asymmetric Bilateral Relations

The asymmetry in this trade relationship can be understood, first, through the Heckscher-Ohlin framework, which argues that countries tend to export goods that make intensive use of their most abundant and relatively inexpensive factors of production. In this case, Bangladesh has a clear comparative advantage in labor-intensive manufacturing, while Spain is better positioned in capital-intensive, more technologically sophisticated activities (Heckscher and Ohlin, 1991). Still, factor endowments alone do not fully capture the complexity of contemporary trade. New Trade Theory adds an important layer to this explanation. As Krugman (1979) and Melitz (2003) show, trade patterns are also shaped by economies of scale and differences in firm productivity. Melitz, in particular, explains that only the most productive firms can bear the fixed costs of exporting—such as transport, certification, and regulatory compliance—and thereby succeed in entering demanding, highly competitive markets like Spain (Melitz, 2003).

Helpman (2006) adds another important dimension to this relationship by emphasizing the role of Global Value Chains. In these fragmented production systems, Bangladesh mainly performs the lower-value stages of assembly and manufacturing, while Spanish firms tend to control the higher-value activities of design, branding, and retail. This division helps explain both the strength and the vulnerability of the current trade pattern. As Hausmann and Rodrik (2003) argue, long-term, sustainable growth depends on a country's ability to engage in self-discovery and gradually diversify its export base toward more complex, non-traditional products.

2.2 The Gravity Model, EU Preferences, and Diaspora Networks

To empirically examine bilateral trade volumes, this study employs an augmented gravity model. In its conventional form, the model predicts that trade rises with economic size and falls with the frictions associated with distance. In the Bangladesh–Spain case, however, that relationship is mediated by a powerful institutional factor. Martínez-Zarzoso and Nowak-Lehmann (2003) and Hossain and Haque (2022) suggest that preferential access to European markets can substantially offset the constraints imposed by geography. More specifically, the Everything-But-Arms initiative has provided duty-free and quota-free access for all products except arms and ammunition, thereby easing one of the principal cost barriers facing Bangladeshi exports. In practical terms, this arrangement has narrowed the effective economic distance between Dhaka and Madrid. Alam (2015) reinforces this view by arguing that institutional trade preferences, rather than physical proximity alone, have been central to the direction and expansion of Bangladesh's exports to the European Union.

The bilateral relationship is also strengthened by demographic integration and the mobility of human capital. Gould (1994) was among the first to show that diaspora networks can reduce transaction costs and ease information asymmetries in international trade. In practice, migrant communities often serve as commercial bridges, drawing on their knowledge of consumer preferences, legal systems, and business practices in both the home and host countries. This familiarity helps lower the uncertainties associated with cross-border exchange and contract enforcement. In Spain, the presence of approximately 25,000 Bangladeshi nationals has created an important informal network that supports business connections and facilitates export expansion.

From a broader macroeconomic standpoint, the durability of this trade relationship rests on a clear structural complementarity between the two economies. Ventura (2005) points to the capacity of advanced economies such as Spain to absorb low-cost imports from emerging markets through sustained domestic demand. In this setting, Spain benefits from access to affordable consumer goods that help preserve purchasing power and moderate inflationary pressures, while Bangladesh gains the external demand necessary to sustain industrialization and export-led growth.

2.3 LDC Graduation, ESG Compliance, and Structural Challenges

One of the most important strands of the literature focuses on Bangladesh's expected graduation from Least Developed Country (LDC) status in 2029. Razzaque and Rahman (2019) argue that, once preferential access under the EBA framework ends, Bangladeshi exports could face significant tariff pressures unless the country successfully transitions to the European Union's GSP+ regime. Yet this shift is far from automatic. It depends on the effective implementation of a wide range of international conventions covering labor and human rights, environmental protection, and good governance. In this context, Moazzem and Hossain (2022) show that European buyers are placing growing emphasis on labor conditions and regulatory standards, reflecting a broader change in which compliance is moving from a voluntary form of corporate responsibility to a mandatory legal requirement across Europe.

These institutional challenges are further intensified by the European Carbon Border Adjustment Mechanism (CBAM), which Khatun (2021) identifies as a major threat to Bangladesh's export model. As the European Union advances its Green Deal agenda, the carbon footprint of Bangladeshi exports is likely to come under closer scrutiny and face possible penalties. This shift places growing pressure on a trade strategy that has long depended on cost competitiveness.

In this setting, adapting to stricter environmental standards requires substantial capital investment and broad operational change. Kim et al. (2025) offer an important framework for understanding the role of environmental, social, and governance (ESG) lending in this transition. Their findings show that firms financed through high-transparency sustainability-linked loans are more likely to maintain their environmental performance, whereas those relying on low-transparency borrowing often experience a deterioration in outcomes after the loans are issued.

For Bangladesh's textile sector, access to high-transparency finance is becoming essential not only for demonstrating compliance, but also for remaining competitive in Spain's demanding retail market. As one of Europe's major headquarters of global fast fashion, Spain is increasingly shifting toward circular-economy practices and full supply-chain traceability. In this context, Bangladesh faces a closely linked dual challenge: it must finance a costly green industrial transition while also providing credible, verifiable evidence of ESG compliance to preserve its market position in Spain and the wider European Union.

The European Union's regulatory framework has recently been strengthened by the Corporate Sustainability Due Diligence Directive (CSDDD). Under this directive, major Spanish retailers are increasingly required to verify that environmental and human rights standards are respected throughout their global supply chains. For Bangladesh's garment industry, this means that ESG compliance is no longer simply a reputational advantage; it has become a basic condition for market access. Firms that cannot provide credible evidence of carbon performance and ethical labor practices risk being excluded from the sourcing networks of leading Spanish fashion companies. Whether the gravity model data from 2000–2025 already capture early signals of this regulatory shift is one of the questions the empirical analysis in Section 4 examines directly.

3.0. Methodology

This study employs an augmented gravity model within a quantitative international macroeconomic framework to analyze bilateral trade flows between Bangladesh and Spain over the period 2000–2025. The methodological approach is intended to capture not only the conventional determinants of trade, particularly economic size, but also the structural shifts and macroeconomic disturbances that have shaped this South Asia–Europe trade relationship in the twenty-first century.

3.1. Theoretical Foundation of the Gravity Model

The empirical strategy adopted in this study is grounded in the Gravity Model of International Trade, one of the most enduring analytical frameworks in spatial econometrics since Tinbergen (1962). Its relevance lies not simply in its parsimonious intuition—that larger economies trade more and distant partners trade less—but in its continued capacity to explain bilateral exchange under complex real-world conditions. In the Bangladesh–Spain corridor, however, a conventional specification would leave the central puzzle unresolved: despite the considerable geographic distance between Dhaka and Madrid, bilateral trade has expanded markedly. As argued here, that apparent contradiction can only be understood by considering the institutional architecture that has effectively reduced trade frictions. For this reason, the analysis also draws on the micro-founded contributions of Anderson and Wincoop (2003), particularly the concept of multilateral

resistance, which situates bilateral trade patterns within the wider system of relative prices and barriers rather than treating them in isolation.

Building on the conventional gravity framework, the model incorporates explanatory variables beyond GDP, including population density, fiscal stability, proxied by public debt, and macroeconomic volatility, captured through CPI inflation. These additions make it possible to account for broader structural conditions that influence trade performance, particularly those related to absorptive capacity and supply-side constraints emphasized in more recent scholarship (Chakma, 2025).

3.2 Econometric Specification and HAC Estimation

The relationship is estimated using an Ordinary Least Squares (OLS) framework applied to a log-linearized version of the gravity equation. To ensure seamless transition across word processing software during editorial phases, the baseline empirical specification is defined using standard linear algebraic notation:

$$\ln(Trade_t) = \beta_0 + \beta_1 \ln(GDP_{BGD,t}) + \beta_2 \ln(GDP_{ESP,t}) + \sum_{k=1}^{n} \gamma_k X_{kt} + \epsilon_t \qquad (1)$$

In this specification, the dependent variable is the natural logarithm of the bilateral trade volume at time t. The coefficients β_1 and β_2 represent the core gravity elasticities of economic mass for Bangladesh and Spain, respectively. The term X_{kt} represents the vector of augmented independent variables (such as demographic scale and macroeconomic friction indicators), and ϵ_t is the stochastic error term. The choice of a log-log specification is motivated by two critical factors: first, it allows for the direct interpretation of the estimated coefficients as constant elasticities, which is essential for policy simulations; and second, it stabilizes the variance of the error term, mitigating the risks of non-normality in macroeconomic series.

To preserve the validity of the t-statistics and reduce the risk of spurious inference, the models are estimated with Heteroskedasticity- and Autocorrelation-Consistent (HAC) standard errors, following the procedure proposed by Newey and West (1987). This adjustment is especially important for the 2000–2025 sample, where the time-series structure of the data makes serial correlation across consecutive observations highly plausible. In addition, the contrast between Bangladesh's rapid export-led growth and Spain's relatively mature, stable macroeconomic environment may lead to non-constant error variance. By correcting the covariance matrix without modifying the OLS point estimates, the HAC estimator provides a more reliable basis for statistical inference and strengthens the robustness of the study's policy conclusions.

3.3. Computational Ecosystem, Data Sourcing, and Variable Construction

The analytical procedure followed a dual-platform workflow intended to improve accuracy, reproducibility, and internal consistency. GRETL 2026a served as the primary econometric environment for time-series estimation, diagnostic testing—including Augmented Dickey-Fuller unit-root tests—and the computation of robust standard errors. Python 3.14.2 complemented this workflow by supporting data processing, missing-value treatment, and the generation of high-resolution graphical outputs. Taken together, the use of the Pandas library for data management and *Statsmodels* for cross-checking OLS estimates added a further layer of methodological reliability.

A second methodological priority was the careful construction and harmonization of the dataset. The variables were selected to reflect both economic scale and broader structural conditions. The dependent variable, bilateral trade volume, was transformed into natural logarithms in order to accommodate exponential growth patterns and reduce the influence of extreme values. The main explanatory variables—real GDP for Bangladesh and Spain—were expressed in constant 2015

US dollars, thereby removing inflationary distortions and allowing the analysis to focus more directly on changes in real output and productive capacity.

To account for demographic scale, the total population of Bangladesh was transformed to the logarithm and used as a proxy for the workforce base underpinning the labor-intensive Ready-Made Garment (RMG) sector. Variables capturing macroeconomic frictions—most notably the Consumer Price Index (CPI) inflation rate and the public debt-to-GDP ratio—were retained in percentage terms. Their estimated coefficients are therefore interpreted as semi-elasticities, showing the percentage change in trade volume associated with a one-unit increase in domestic instability. Socioeconomic indicators, including the national poverty rate and the GINI index, were also incorporated in order to assess the broader social dividends of trade expansion. Finally, a binary post-2013 dummy variable was introduced to identify the structural break associated with the Rana Plaza collapse and the subsequent tightening of European Union compliance requirements.

The dataset was compiled from several authoritative public databases to ensure broad and consistent coverage across the 26-year sample period:

- **World Bank (WDI and WITS):** The World Development Indicators database provided the core macroeconomic and demographic series used in the analysis, while the World Integrated Trade Solution served as the main source for bilateral trade matrices. WITS was especially valuable for cross-checking mirror statistics - comparing Bangladesh's reported exports with Spain's recorded imports - to address the discrepancies that frequently arise in international customs data.
- **International Monetary Fund (WEO):** The World Economic Outlook database provided key indicators on fiscal deficits, public debt, and CPI dynamics. It was particularly useful for extending the empirical series through the final years of the panel (2024–2025), where projected values were needed to preserve temporal consistency in the dataset.
- **CEPII (Gravity Database):** The *Centre d'Études Prospectives et d'Informations Internationales* (CEPII), located in Paris, France, provided the time-invariant constants essential for baseline gravity verification.

Taken together, integrating these sources into a single, coherent dataset enables the study to connect abstract trade theory with the practical demands of socio-economic policy analysis. This harmonized empirical foundation strengthens both the model's analytical consistency and the policy relevance of the results.

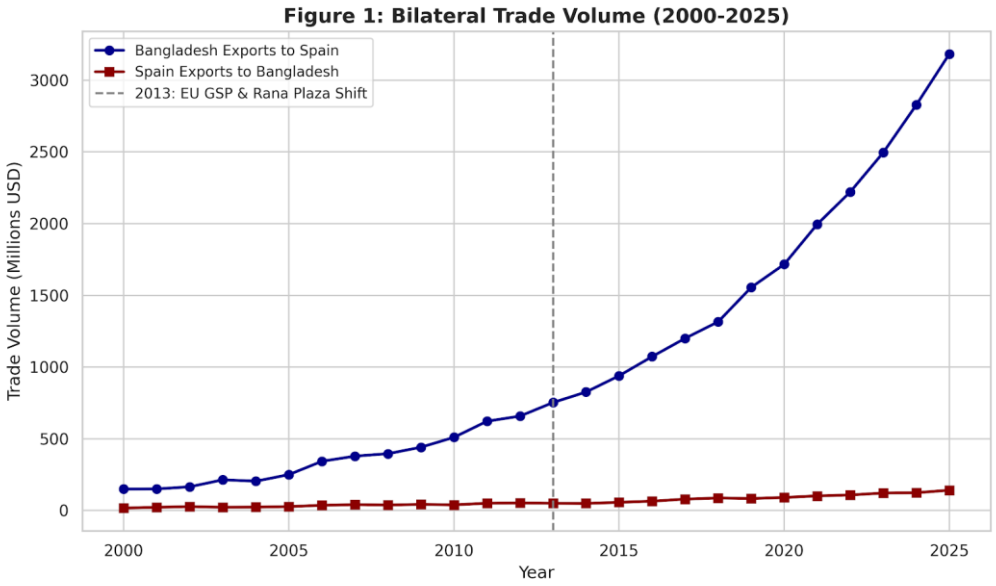
4.0. Empirical Results and Discussion

This section presents the study's empirical findings and examines them to progressively clarify the main dynamics of the Bangladesh–Spain trade corridor. It begins with a descriptive overview of the macroeconomic asymmetries between the two economies, then proceeds to the core augmented gravity model estimations used to identify export elasticities and structural breaks. The discussion then broadens to consider how internal macroeconomic frictions and wider socio-demographic gains - particularly poverty reduction - have interacted with this process of bilateral integration.

4.1. Descriptive Analysis and Macroeconomic Asymmetry

The descriptive analysis of this trade corridor begins with the marked structural asymmetries that shape the relationship between the two economies. As shown in Figure 1, bilateral trade has evolved along a clearly uneven path: Bangladeshi exports to the Spanish market have expanded

at an accelerated pace, while Spanish exports to Dhaka have remained comparatively limited and structurally subdued.



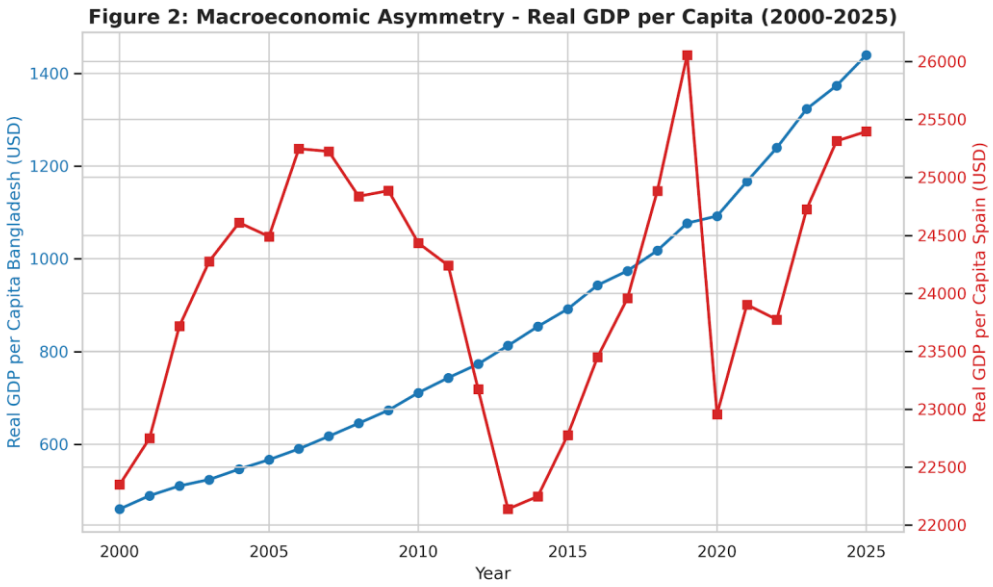
This imbalance is not simply a statistical artifact, but a clear expression of the deep macroeconomic asymmetry that underpins the bilateral relationship. The descriptive statistics reported in Table 1 make this pattern especially visible. The mean value of Bangladeshi exports to Spain (USD 1,022.55 million) is well above the median (USD 705.59 million), indicating a pronounced right-skewed distribution driven by the rapid acceleration of exports in the most recent decade. By contrast, Spanish exports to Bangladesh remained comparatively modest, averaging only USD 61.96 million over the same period.

Table 1: Expanded Descriptive Statistics of Key Variables (2000–2025)

Variable	**Mean**	**Median**	**Std. Dev.**	**Min**	**Max**
Panel A: Bilateral Trade Frequencies					
Bilateral Exp. BGD to ESP (M USD)	1022.55	705.59	890.19	149.61	3182.41
Bilateral Exp. ESP to BGD (M USD)	61.96	50.93	35.63	17.57	141.72
Panel B: Macroeconomic Fundamentals					
Real GDP Bangladesh (B USD)	132.08	119.81	56.70	60.00	249.13
Real GDP Spain (B USD)	1070.24	1070.16	83.15	900.00	1229.71
CPI Inflation Bangladesh (%)	7.03	7.11	1.80	3.36	9.98
CPI Inflation Spain (%)	2.54	2.26	1.39	1.00	8.40
Panel C: Socio-Demographic Indicators (Bangladesh)					
Poverty Rate (%)	33.80	33.80	9.23	18.70	48.90
GINI Index	32.52	32.51	0.58	31.25	33.82

Notes: Panel dataset spanning 2000-2025. Data sources: WDI, WITS, and IMF.

The primary driver of this commercial specialization is the profound income gap captured in Figure 2. The real GDP per capita of Spain, which has historically oscillated around 25,000 USD, contrasts with Bangladesh's rising but still nascent level (approximately 1,440 USD by 2025), creating a clear Heckscher-Ohlin environment.



A decisive shift in this relationship emerged around 2013, when stricter compliance requirements and tighter European Union regulatory standards began to reshape the terms of bilateral trade. As Table 2 indicates, the contrast between the pre- and post-2013 periods is substantial. The average value of Bangladeshi exports rose from USD 345.11 million to nearly USD 1.7 billion, representing an increase of 392%. Over the same period, the poverty rate fell markedly, from 41.65% to 25.94%, suggesting that the deepening of this bilateral trade corridor has been associated not only with commercial expansion, but also with meaningful social progress.

Table 2: Structural Break Analysis: Pre-2013 vs. Post-2013 averages

Variable	Pre-2013 (2000-2012)	Post-2013 (2013-2025)	Delta (Δ)
Bilateral Exp. BGD to ESP (M USD)	345.11	1699.99	+ 1354.88
Bilateral Exp. ESP to BGD (M USD)	34.34	89.59	+ 55.25
Real GDP Bangladesh (B USD)	85.46	178.71	+ 93.25
CPI Inflation Bangladesh (%)	6.64	7.43	+ 0.79
Poverty Rate Bangladesh (%)	41.65	25.94	- 15.71

Notes: The structural break honors the 2013 EU GSP modifications. Delta represents the absolute difference in means between the two historical panels.

The fiscal and monetary health of both nations further contextualizes this interaction. While Spain has grappled with public debt levels often exceeding 100 percent of GDP, Bangladesh has maintained a more conservative fiscal profile. However, as noted in Table 1, Bangladesh's higher inflation volatility (CPI Panel B) creates persistent pressure on real exchange rates, which manufacturers must offset through continuous productivity gains. Finally, the extreme population density in Bangladesh creates a constant surplus of labor, reinforcing the comparative advantage in Ready-Made Garment (RMG) manufacturing to supply the high demand for affordable consumer goods in Spain.

4.2. Comparative Evolution Analysis: 2000, 2012, and 2025

To place the bilateral relationship in historical perspective, Table 3 compares three key benchmark years: the 2000 baseline, the pre-structural-shift year 2012, and the 2025 endpoint. This temporal cross-section highlights the remarkable expansion of the Bangladeshi economy, whose real output increased almost fourfold over the period, thereby narrowing—though not eliminating—the macroeconomic distance that has long separated it from Spain.

Table 3: Macroeconomic Evolution: Bangladesh and Spain (2000, 2012, 2025)

	Bangladesh			Spain		
Indicator	**2000**	**2012**	**2025**	**2000**	**2012**	**2025**
Real GDP (Billion USD)	60.00	116.56	249.13	900.00	1021.25	1229.71
Real GDP per Capita (USD)	460.65	773.15	1439.56	22349.14	23173.36	25396.74
CPI Inflation (%)	6.14	5.45	5.78	1.28	2.52	2.96
Public Debt (% of GDP)	31.06	36.14	42.50	50.00	80.00	105.89

Sources: As described above in section 3.3.

The economic expansion has been accompanied by a profound socio-demographic transformation, as detailed in Table 4. This transition reflects the underlying human drivers and social outcomes of the commercial integration between Dhaka and Madrid.

Table 4: Socio-Demographic Evolution (2000, 2012, 2025)

	Bangladesh			Spain		
Indicator	**2000**	**2012**	**2025**	**2000**	**2012**	**2025**
Population (Millions)	130.25	150.76	173.06	40.27	44.07	48.42
Density (People per km^2)	877.34	1015.49	1165.70	79.59	87.10	95.69
Poverty Rate (%)	48.90	34.40	18.70	21.07	18.50	19.18
GINI Index	32.95	32.25	31.52	33.20	33.80	31.57

Sources: As described above in section 3.3.

The socio-demographic transition summarized in Table 4 brings the human dimension of this bilateral corridor into particular clarity. Its most notable outcome is the sharp decline in Bangladesh's poverty rate, which fell from 48.9% to 18.7% over the period under study. This pattern suggests that export-led industrialization, especially through the labor-intensive RMG sector, has functioned as an important channel of social advancement by drawing large numbers of workers into the formal economy. At the same time, these gains coexist with intense demographic pressure. Bangladesh's population density rose to 1,165 people per square kilometer, a level far above Spain's comparatively stable figure of 95.69. Such concentration places growing strain on infrastructure and the environment, reinforcing the need for a gradual shift toward higher-value production and more effective spatial planning. Although inequality, as measured by the GINI index, remained relatively stable in both countries, their contrasting demographic trajectories continue to reveal a deeper structural complementarity: Bangladesh contributes the labor force that sustains large-scale production, while Spain provides the mature and stable demand that helps support this broader process of social transformation.

4.3. Gravity Model Estimations (Models 1, 2, and 3)

The central econometric analysis is based on three nested specifications of the gravity equation, each estimated through Ordinary Least Squares (OLS) with Heteroskedasticity- and Autocorrelation-Consistent (HAC) standard errors. Table 5 reports the results of these models, in all of which the dependent variable is defined as the natural logarithm of bilateral trade volume.

Model 1 establishes the fundamental relationship for gravity. The estimated elasticity for Bangladesh's real p (less than 0.01) is exceptionally high, indicating that export volume is super-elastic to domestic productive expansion. Economically, this suggests that for every 1 percent increase in Bangladesh's national output, the commercial flow to Spain increases by more than double. Conversely, the coefficient for Spain's real GDP is statistically insignificant (0.057, p>

0.1). This finding is of paramount importance: it implies that Spanish demand for Bangladeshi apparel is largely decoupled from the Spanish business cycle. During periods of recession in Spain, the demand for low-cost garments from the RMG sector remains rigid, as consumers substitute higher-end apparel for more affordable alternatives, reinforcing the resilience of the Bangladeshi export engine.

Table 5: Gravity Model Estimations (Dependent Variable: ln (Trade))

Independent Variables	Model 1 (Baseline)	Model 2 (Demographic)	Model 3 (Structural)
Log Real GDP (Bangladesh)	2.206*** (0.070)	0.508 (0.340)	2.431*** (0.086)
Log Real GDP (Spain)	0.057 (0.341)	-0.124 (0.237)	0.130 (0.359)
Log Population (Bangladesh)		8.206*** (1.766)	
Post-2013 Dummy			1.805*** (0.489)
Post-2013 × Log GDP (BGD)			-0.384*** (0.102)
R-squared	0.994	0.997	0.996

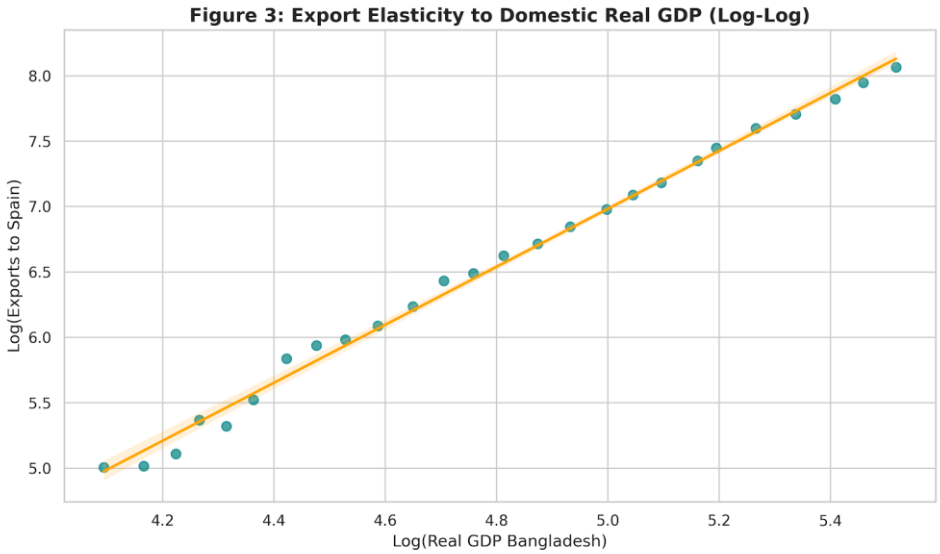
*Notes: Robust HAC standard errors in parentheses. *** p<0.01. Observations: 26.*

Model 2 augments the specification by introducing the log-population of Bangladesh. In this version, the economic mass effect of GDP is partially absorbed by the demographic scale, which shows a large, statistically significant coefficient. This result indicates that bilateral trade is closely linked to Bangladesh's demographic dividend, with its large labor force serving as a central foundation of productive capacity and enabling the country to meet the scale demanded by major Spanish buyers. At the same time, the size of this coefficient points to an important structural vulnerability: a trade model that depends so heavily on population scale may encounter diminishing returns as labor costs gradually rise after LDC graduation in 2029.

Model 3 identifies the structural break associated with the post-2013 era, marked by the Rana Plaza aftermath and the subsequent tightening of EU compliance regulations. The econometric specification for this model incorporates a shift in the intercept and a change in the slope:

$$\ln(Trade) = \beta_0 + \delta_1 Dummy2013 + \beta_1 \ln(GDP_{BGD}) + \delta_2 (Dummy2013 \times \ln(GDP_{BGD})) \quad (2)$$

The results are paradoxical and highly instructive. The positive and significant shift in the intercept ($\delta_1 = 1.80, p < 0.01$) suggests that the institutional reforms and factory safety accords implemented after 2013 increased the "trust level" of Spanish buyers, effectively elevating the baseline volume of trade. This indicates that compliance is a trade-facilitating factor. However, the negative interaction term ($\delta_2 = -0.38, p < 0.01$) reveals a maturation of the growth elasticity. While the absolute level of trade is higher in the post-2013 period, the rate of trade growth relative to GDP expansion has slowed. This signaling indicates that the "low-hanging fruit" of labor-intensive expansion is reaching saturation, and future growth will require a pivot toward high-transparency ESG frameworks and technological upgrading.



What the three models reveal, taken together, is a corridor in transition. Demographic scale and post-2013 compliance reforms have solidified a durable commercial base, but the growth elasticity is clearly decelerating. The question is no longer whether Bangladesh can sustain its export volume to Spain—the data suggest it can—but whether the current model can generate the kind of upgrading that LDC graduation will demand. That requires looking inside the Bangladeshi economy, at the macroeconomic frictions and social outcomes that the baseline gravity specification deliberately holds in the background.

4.4. Extended Models: Macroeconomic Frictions and Social Dividends

To provide a comprehensive analysis of the internal mechanisms shaping trade performance, Models 4 and 5 test the impact of macroeconomic instability and socioeconomic drivers. The empirical specifications for these extended models are formally defined as follows:

$$\ln(Trade_t) = \alpha_0 + \alpha_1 \ln(GDP_{BGD,t}) + \alpha_2 INF_{BGD,t} + \alpha_3 Debt_{BGD,t} + \epsilon_t \quad (3)$$

$$\ln(Trade_t) = \lambda_0 + \lambda_1 \ln(GDP_{BGD,t}) + \lambda_2 Poverty_{BGD,t} + \nu_t \quad (4)$$

Table 6 presents the results of these regressions. Model 4 introduces variables representing domestic monetary and fiscal frictions. The rate of domestic inflation in Bangladesh has a significantly negative impact on export performance ($\beta = -0.021, p < 0.01$). This indicates that rising local operational costs rapidly erode the razor-thin margins on which the textile sector's comparative advantage relies, acting as a potent form of multilateral resistance.

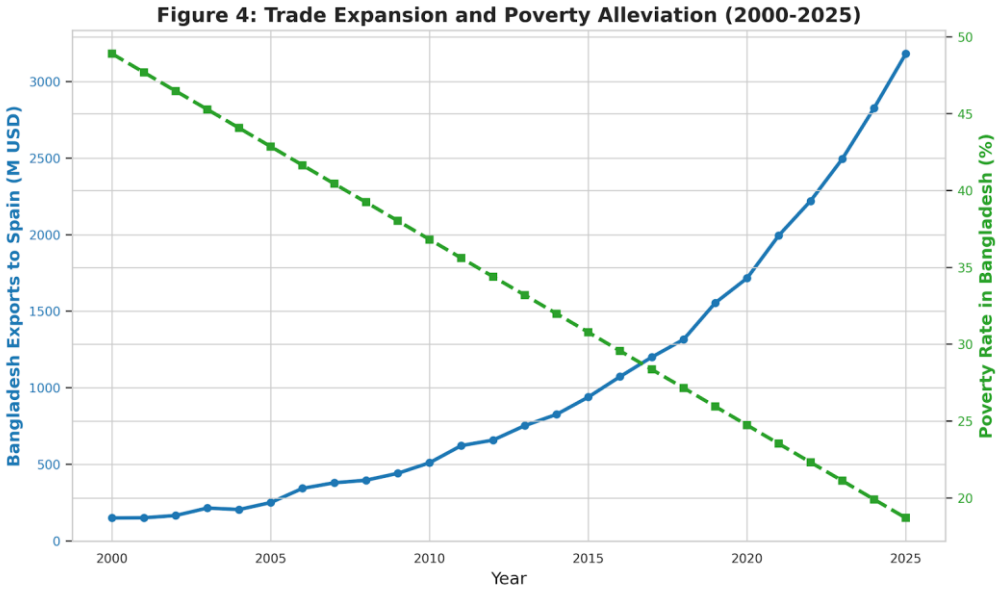
Table 6: Extended Models - Macroeconomic Instability and Socioeconomic Drivers

Independent Variables	Model 4 (Macro Frictions)	Model 5 (Social Dividend)
Log Real GDP (Bangladesh)	2.034*** (0.063)	-1.909** (0.824)
CPI Inflation (BGD, %)	-0.021*** (0.006)	
Public Debt (BGD, %)	0.024*** (0.009)	
Poverty Rate (BGD, %)		-0.192*** (0.039)
Constant	-4.019***	23.050***

*Notes: Robust HAC standard errors in parentheses. ** p<0.05, *** p<0.01. Dependent variable:* ln(*Trade*)

It is precisely in managing these financial frictions that sustainable capital allocation becomes especially important. Following the framework developed by Kim et al. (2025), Bangladeshi manufacturers require substantial capital inflows not only to absorb domestic macroeconomic pressures but also to comply with increasingly demanding European environmental standards. Yet the quality of that financing is as important as its quantity. When funding is channeled through low-transparency mechanisms, capital tends to be misallocated, ESG performance weakens, and commercial credibility with Spanish buyers may deteriorate. By contrast, high-transparency sustainability-linked loans can serve as a critical buffer against domestic instability while also strengthening firms' capacity to signal credible environmental compliance.

Model 5 evaluates the social dividends of the bilateral trade corridor. The relationship between economic activity and welfare is consistent with recent domestic literature; for instance, Roy et al. (2023) underscore how targeted capital allocation and financial performance are fundamental drivers of socio-economic development for Bangladeshi entrepreneurs. Our regression results extend this perspective to the international trade arena, revealing a powerful inverse relationship between export volumes and national poverty levels ($\lambda_2 = -0.192, p < 0.01$).



The visual evidence presented in Figure 4 reinforces this interpretation by showing a pronounced scissors effect: as exports to the Spanish market expanded sharply over the period, Bangladesh's national poverty rate declined just as markedly. Taken together, the extended models suggest that, although macroeconomic frictions continue to place pressure on export margins, the socio-demographic gains associated with this bilateral relationship have been substantial. Preserving these gains in the post-2029 context will require policymakers to ensure that institutional transparency evolves in step with the scale and ambition of the country's trade strategy.

In this sense, the extended models show that domestic macroeconomic frictions remain a persistent constraint on export competitiveness, even as the bilateral trade corridor continues to operate as an important engine of social progress. This dual dynamic suggests that the long-term sustainability of Bangladesh's success in the Spanish market will depend not only on maintaining trade volumes but also on strengthening the institutional capacity needed to manage internal volatility while safeguarding the social dividends already achieved. These results provide a clear bridge to the final strategic recommendations for the post-2029 transition.

The scissors effect shown in Figure 4—capturing the divergence between export expansion and declining poverty—points to a deeper structural transformation within the Bangladeshi economy.

More specifically, it reflects the operation of a labor-absorption mechanism through which large numbers of workers moved from low-productivity subsistence agriculture into formal industrial employment. In this process, sustained demand from the Spanish market has served as an important stabilizing force, generating foreign-exchange earnings and supporting continuous job creation. Model 5 estimates that each percentage-point expansion in export volume is associated with a 0.192-point decline in the national poverty rate—a coefficient that is both statistically robust and substantively large. Whether this relationship will persist through the post-2029 transition, when preferential access ends and compliance costs rise, is the central policy question that Section 5 addresses.

5.0. Conclusion and Policy Implications

The empirical analysis of the bilateral economic corridor between Bangladesh and Spain over the period 2000–2025 reveals a relationship shaped by marked structural asymmetry, notable resilience, and a growing need for institutional adaptation. Taken as a whole, the evidence suggests that this partnership has evolved beyond a simple pattern of commercial exchange and now reflects a more complex process of uneven but durable economic integration.

However, the evidence also points to a structural ceiling. The traditional drivers of this success—abundant low-cost labor and non-reciprocal preferential access—are approaching exhaustion. The structural break analysis post-2013 shows that while factory safety accords and compliance reforms elevated the baseline trust of Spanish buyers, the marginal growth rate relative to GDP has begun to decelerate. The "low-hanging fruit" of labor-intensive expansion is running out, and extreme population density is beginning to translate into infrastructural stress rather than productive advantage.

As Bangladesh approaches its definitive graduation from Least Developed Country (LDC) status in 2029, the policy implications derived from this study are both urgent and multifaceted. First, the transition from the Everything-But-Arms (EBA) initiative to the GSP+ regime requires a sophisticated diplomatic and industrial pivot. To secure the 0% tariff benefit under GSP+, Bangladesh must not only maintain its competitive pricing but also prove its unwavering commitment to 27 international conventions on human rights, employment standards, and good governance. The loss of non-reciprocal preferences will introduce an 11% to 12% tariff friction that can only be offset by massive leaps in operational efficiency and value-chain upgrading.

Second, the evidence on macroeconomic frictions and domestic inflation points to the need for a renewed financial architecture. In line with the framework proposed by Kim et al. (2025), the future viability of Bangladesh's RMG sector in the Spanish market will increasingly depend on the quality—not merely the availability—of sustainable finance. As Spanish retail groups face more stringent European Union ESG disclosure requirements, they are likely to favor suppliers that can demonstrate credible, verifiable environmental compliance. For this reason, both the Bangladeshi banking sector and industrial leaders will need to strengthen high-transparency ESG lending frameworks. As Kim et al. (2025) caution, low-transparency sustainability-linked loans often fail to improve environmental performance and may even weaken it. By contrast, high-transparency financial instruments can serve as a vital signaling mechanism, helping to ensure that Bangladesh's green industrial transition is both credible and financeable in the eyes of Spanish buyers.

Third, Bangladesh's policy agenda must place greater emphasis on diversifying the export basket. Although the RMG sector has played a transformative role in poverty reduction, its heavy reliance on a single export pillar also creates a clear structural vulnerability. In line with the "self-discovery" framework developed by Hausmann and Rodrik (2003), public-private collaboration should focus on identifying and scaling more sophisticated sectors—such as pharmaceuticals,

blue economy products, and higher-value electronics—that can build on the logistics capabilities already developed through the apparel industry. At the same time, industrial strategy should promote a gradual move into technical and high-performance textiles to reduce the risk of a post-2029 middle-income trap. Segments such as medical textiles, eco-friendly synthetics, and specialized activewear offer promising pathways to move up the value chain and secure higher-value demand in the Spanish market. In parallel, the development of ESG-certified industrial parks could provide a strong signal to Spanish investors and buyers seeking transparency, traceability, and environmental credibility across supply chains. By integrating renewable energy and advanced water-recycling systems directly into production processes, Bangladesh would be better positioned to consolidate its role as a credible green partner for European brands and to ensure that LDC graduation leads to more resilient and sustainable trade relations.

Finally, the socio-demographic dividend identified in this study can only be sustained through continued investment in human capital. Although Bangladesh's high population density provides a large and flexible labor force, future growth cannot depend solely on scale; it must increasingly rest on improvements in productivity, skills, and the quality of output. A gradual transition from basic assembly to higher-value design, technical textiles, and more knowledge-intensive manufacturing will be essential if the inverse relationship between trade expansion and poverty reduction observed in Model 5 is to be preserved over time. In this sense, the next phase of Bangladesh–Spain economic relations is likely to be defined by a shift from a volume-based partnership to one centered on value creation, transparency, and institutional credibility. If Bangladesh aligns its industrial upgrading with the increasingly demanding ESG and CBAM standards of the European Union, this bilateral corridor may continue to serve as a significant example of successful North–South integration in the twenty-first century.

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