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The Belt and Road Initiative in South Asia: A Difference-in-Differences Analysis of Trade, Investment, and Debt

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About Article

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ABSTRACT

China's Belt and Road Initiative (BRI), introduced for South Asia in 2013, has transformed the region's economy and connectivity landscape with increasing financial risk. This study compares Bangladesh, China, and India in 2010, 2013, and 2023 to depict the relationship of trade openness, foreign investment, and debt with BRI participation. The outcomes of the research show the importance of regional characteristics for better economic outcomes. More particularly, the quality of governance and stronger absorptive capacity. Following 2013, trade openness expanded moderately in BRI-participating economies, while FDI inflows declined across both BRI participant and non-participant economies, suggesting global and domestic structural drivers at play. As borrowing increases, debt service obligations likewise increase. The fixed-effects difference-in-differences model explains a large share of the variation ($R^2 \approx 0.94$ and 0.75), but the short-run interaction effects of BRI participation are not statistically significant. To sum up, large infrastructure projects deliver measurable results only when the countries have strong institutional capacity and governance. Thus, such projects must go hand-in-hand with domestic reforms as well as external financing.

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1. INTRODUCTION

The Belt and Road Initiative (BRI), a transnational connectivity and infrastructure agenda that began in China in 2013, is now one of the largest development initiatives of the 21st century. The project largely aims to bring greater economic integration across Asia, Europe, and Africa through the large-scale investment in transport, energy, and communication networks. According to their advocates, such programs will be able to increase trade and FDI, and will address structural problems in less developed economies. However, critics identify financial risks, administrative challenges, and over-dependency risk in the long run. To identify the opportunities and risks, an empirical evaluation is required that looks beyond the static effects and finds the slow-moving changes in the structural part of big infrastructure projects.

Studies on the Belt and Road Initiative (BRI) have increased significantly. Quantitative studies on the BRI tend to employ gravity models or panel regressions, and they often find evidence of new trade and foreign direct investment (FDI). In parallel, qualitative and case-based research is examining issues of debt sustainability, transparency, and geopolitical alignment. However, the South Asia region remains relatively less studied where economic constraint, institutional variations, and geopolitical tensions converge. Also, many existing studies investigated either economic or strategic dimensions rather than analysing them together in one integrated framework.

The region of South Asia proves to be an especially useful context. Bangladesh, Pakistan, Sri Lanka, and India have different levels of participation and political alignment with the BRI, resulting in a natural basis for comparisons. Through these comparisons, it will be possible to explore how institutional capacity, financial conditions, and strategic choices influence outcomes.

This paper seeks to analyse the relationship between BRI engagement and trade openness, FDI inflows, and external debt dynamics in South Asia in 2010-2023. It adopts a comparative mixed-method approach involving descriptive regional comparison and empirical panel analysis that incorporates fixed effects and a difference-in-differences structure. Instead of using this as a completely robust quasi-experimental design, the model supports cross-country comparison and highlights the contextual factors that condition economic outcomes. The paper makes three contributions: it brings together economic and geopolitical analysis in a single comparative framework; it provides region-specific empirical evidence on a less-studied part of the BRI; and it identifies institutional and circumstantial conditions that render infrastructure-led growth possible without giving rise to fiscal or strategic vulnerabilities. The results of the study are relevant for policymakers concerned with infrastructure financing and its institutional reform, and regional cooperation in transnational development projects.

2. LITERATURE REVIEW

The Belt and Road Initiative (BRI) was established in 2013 to develop trade connectivity and infrastructure throughout Asia, Africa, and Europe through investments in transport, energy, and communication networks. As there won't be separate projects for the African countries, they all have to be part of the same project.

In addition, a growing body of empirical research suggests that participation in a BRI arrangement can significantly increase bilateral trade flows and attract foreign direct investment (FDI), largely through reductions in logistics frictions and improvements in transport capacity. However, qualitative studies have found project-related risks such as cost overrun, low transparency, and uneven sectoral benefits. Nevertheless, the qualitative studies have discovered project-related risks like cost overrun, low transparency, and uneven benefits in the sectors.

Increasingly, the writing related to business includes the results of the firm-level impacts of the BRI. Studies based on customs and production statistics indicate that improved corridors are able to enable goods delivery to be quicker, prompting firms to raise the amount of exports. According to some studies, the method of financing new infrastructure creates new opportunities for subcontracting and enhances supply-chain linkages. However, other work points out that Chinese contractors create competitive pressures on domestic firms. Evidence also suggests that impact of such firms depends on industry and more so on export-oriented services than services. South Asia, nonetheless, remains under-studied. This analyses the connections amongst macro-trends in trade, foreign direct investment, debt, and firm-level dynamics. Since countries in the region are engaging with the BRI on quite different terms, an illustrative comparison of Bangladesh and China and India may clarify how these structural and business environment affect economic outcomes.

2.1. Trade and connectivity effects

BRI-related transport and logistics investments are generally associated with lower trade costs and improved market access. Studies such as Chen and Lin (2018) and Yu *et al.* (2022) show that upgraded corridors support the expansion of manufacturing exports, while Cai (2017) emphasizes the role of institutional reforms in sustaining these gains. At a broader level, a 10% reduction in trade time can raise exports by 5–6% in developing economies (Djankov *et al.*, 2010), illustrating the mechanisms behind the trade openness indicator used in this study.

These trends can be traced in the country's experiences. Some of the projects in Bangladesh, such as the Padma Bridge and Payra Port have minimized delays in logistics and enhanced both import and export connectivity. Previous infrastructure investments in the past have also enhanced the competitiveness of China in its export businesses, which were subsequently enhanced by BRI corridors. As an outsider, BRI, India has been able to spread trade via bilateral agreements and ASEAN structures. These examples are indicative that long-term trade benefits are more related to the quality of infrastructure and policy implementation than BRI membership.

2.2. Foreign direct investment and industrial upgrading

The BRI has not restricted its activities to the development of infrastructure, but it has also encompassed cross-border investment activities. According to Du and Zhang (2020), a decrease in political and logistical uncertainties within the BRI can lead multinational companies to invest in the involved economies. Similarly, García-Herrero and Xu (2019) identify spillovers in manufacturing and logistics, while Hurley *et*

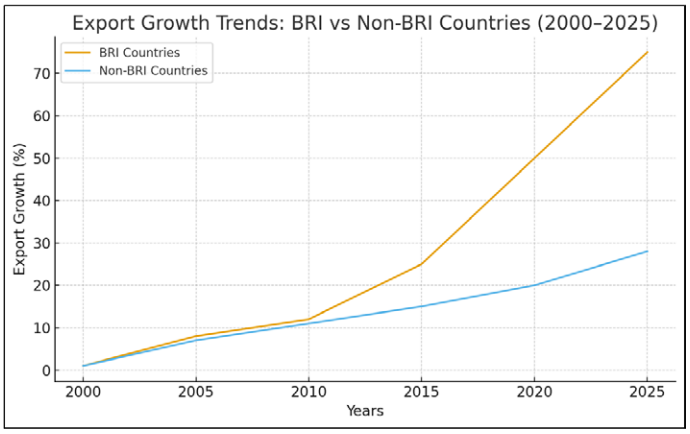

Figure 1. Export growth trends for BRI and non-BRI countries (2000–2025)

al. (2019) note that low-quality project preparation restricts productivity. Following this argument, the panel results of Zhai (2018) and the United Nations Conference on Trade and Development (2022) show that better infrastructure and reduced investment risk are likely to increase FDI inflows, particularly in the transport and energy sectors.

In Bangladesh, Chinese FDI is still power and construction-based, developing infrastructure and establishing weak local connections. By contrast, China is an outward-diversifying investor. Furthermore, the BRI is not responsible for the growth of FDI in India; instead, Indian FDI is driven by internal reforms and the digital sectors. These findings align with our FE-DiD model, which examines the relationship between investor-linked connectivity as well as capacity.

2.3. Debt sustainability and governance

Debt sustainability is a very controversial issue in the BRI. Hurley *et al.* (2019) and Kratz *et al.* (2019) caution that non-concessional financing and questionable terms may be a burden on economies, particularly if poorly performing projects are concerned. According to Yu *et al.* (2022), the problem of poor pay is a local mismanagement problem rather than a Chinese lending problem. Horn *et al.* (2021) and the IMF (2021) put emphasis on the importance of lending transparency and prudent debt management.

Bangladesh has a lower debt-to-GDP ratio, whereas China requires close monitoring of debt-based infrastructure projects. China's policy banks provide Chinese foreign investment a broad range of independently financed exposures. Because of it is an external participant in BRI, India reduces potential for risk from related activities in three different ways, including the use of domestic sources of funds; and through collaboration with multilateral development institutions that can share some of the financial burden of large-scale infrastructure projects. This comparison shows the importance of altering governance; clear procurement, responsible debt management, and environmental protection are important policy tools that can use BRI funds to achieve sustainable growth. Policymakers should focus on improving institutions to reduce risks (both fiscal and political).

2.4. Discussion

A literature consensus has increasingly emerged that the Belt and Road Initiative (BRI) is driving trade and foreign direct investment (FDI). This is achieved by enhancing connectivity, lowering transport expenses, and expanding cross-border infrastructure networks. Quantitative data show that the effects of BRI participation on bilateral trade flows and inflows of inbound FDI have been demonstrated several times consistently using gravity models and panel regressions (Chen & Lin 2018; Yu *et al.* 2022; World Bank 2019). This is particularly powerful in industries with a high infrastructure. However, institutional and financial repercussions are unclear. Hurley *et al.* (2019) and Kratz *et al.* (2019) report that the factors of debt sustainability, transparency, and reliance on Chinese financing remain contentious. This dibate suggests general controversy in the literature. BRI can improve economic performance in the short term.

The available literature includes case and descriptive comparative studies on a case-by-case basis. Such studies are informative but often lack strong causal identification designs. On the other hand, this study employs a fixed-effects difference-in-differences (FE-DiD) model, which exploits panel data from 2010 to 2023 to determine the mean treatment effect of BRI participation by absorbing the heterogeneity of countries and averaging structural variables that are not time-varying. The difference in methodology will help enhance causal interpretation and enable a more stringent cross-country comparison in the South Asian framework.

2.5. Research gap and contribution

These three gaps continued to exist in spite of the growth of the BRI. To begin with, there are limited studies which have compared participants (Bangladesh), non-participants (India), and originators (China) using harmonized macro data. Second, the fiscal sustainability is not known since trade, investment, and debt studies are usually separated. Third, little research has addressed the China-India-Bangladesh strategic triangle and its effect on the BRI.

This study addresses these gaps by using macro-panel econometric methods and comparative political-economic analysis. Its key contributions are:

i. An integrated model that estimates trade, FDI, and debt dynamics together, offering a complete view of BRI's macro impact.

ii. A comparative strategic design syntactically compares the policy designs, decision-making, and the results between Bangladesh (participant), India (non-participant), and China (originator) in a harmonized macroeconomic system.

iii. The paper also analyzes the moderating aspects of governance and sustainability of debt to outline the impact of institutional quality on the outcomes of massive projects in infrastructure. The research results will help policymakers to learn how the Belt and Road Initiative (BRI) is evolving as a part of the intricate geopolitical environment in South Asia.

These results combined give policymakers a better picture of how BRI has transformed in South Asia in the contentious areas.

3. METHODOLOGY

3.1. Methodological overview

The study employs a comparative analytical approach in studying the relationship between BRI involvement, trade openness, FDI inflows, and external debt in South Asia. It does not apply any quasi-experimental framework to the analysis. Instead, it is based on the systematic cross-country comparison to support easy trends in the panel. The small number of countries–Bangladesh, China, and India–that sit in different positions along the BRI spectrum makes this the right approach. The differences between the model and high-frequency trading allow us to do a quantitative comparison without complicating the model too much.

This approach looks at patterns in important prediction and outcome indicators for three economies before and after 2013, the year when the BRI was officially launched, taking into account institutional, geospatial, and strategic differences. This is not intended to produce causal treatment estimates but rather a systematic comparison of economic trajectories under different levels of BRI involvement.

A fixed-effects difference-in-differences model was initially considered; however, with only three countries observed over time, such a model would be severely over-fitted and unsuitable for robust inference. Therefore, the analysis relies on descriptive and comparative evidence, which better matches the structure and limitations of the available data.

3.2. Data sources

This analysis is based on the annual macroeconomic panel data of 2010-2023 for Bangladesh, China and India. The three economies portray different levels of interaction with the Belt and Road Initiative (BRI): China is the major driver, Bangladesh is the major recipient, and India is out of the system as a strategic comparator. The comparison is done according to a methodology: first, we compare the trade openness, investment inflows, industrial activity, and the sustainability of the debt of each country according to their BRI alignment. It then evaluates whether variations in these variables can be linked to the level of BRI involvement. Each variable might be affected differently by the BRI. All data are based on internationally recognized databases, which ensure reliability and consistency in cross-country comparisons.

Table 1. Descriptive Statistics of Variables (2010–2023)

Variable	Obs	Mean	Std. Dev.	Min	Max
Year	42	2016.5	4.07	2010	2023
FDI net inflows (% of GDP)	42	1.52	0.83	0.28	3.94
GDP growth (annual %)	42	6.47	2.56	-5.8	10.6
Industry, value added (% of GDP)	42	32.45	6.54	24.6	45.8
Total debt service (% of GNI)	42	1.61	0.78	0.67	4.61
Exports of goods and services (% of GDP)	42	19.31	4.20	10.44	26.72
Merchandise trade (% of GDP)	42	34.96	6.74	23.1	48.0

Source: Authors's analysis and calculations based on WDI and UNCTAD data
Note: All variables are expressed in a percentage of GDP unless otherwise noted.

Table 1 gives a summary of the macroeconomic indicators used in the model. The data is a 42 observation of three South Asian economies in the period between 2010–2023. During this time, the GDP has been growing at an average of about 6.4%, and foreign direct investment (FDI) inflows comprised about 1.5% of the GDP. The trade in merchandise was between 23.1 and 48 % of the GDP, and the average was 35% (World Bank, 2020). These differences help to point out the structural differences between the three countries with respect to industrial make-up, trade exposure, and fiscal capacity.

4. RESULTS AND DISCUSSION

The study analyses Bangladesh, China, and India from 2010 to 2023. It also dwells on their different engagement with the Belt and Road Initiative (BRI) and its impact on trends in trade openness, foreign direct investment (FDI), and external debt. The World Development Indicators (WDI), together with UNCTAD, IMF statistics, and World Investment Reports data, were used to ensure comparability across countries.

The next table organizes the results as a cross-country comparison instead of an econometric sequence. We aim to interpret how the institutional capacity, strategic position, and sectoral structure of each country influenced economic outcomes at and after the launch of the BRI in 2013.

In Section 4.1 Trade, China's exports (and thus trade) have seen a boom. Bangladesh has seen moderate gains associated with new logistics infrastructure. India's trade benefits from existing regional agreements not associated with the BRI.

We discuss the trends in FDI in section 4.2 and take three significant patterns into consideration. First, we point out that FDI into Bangladesh has reduced following BRI, although substantial investment of infrastructure has been undertaken. The study describes this as crowding out effects and project concentration. Another indicative of a steady or rising FDI is also in India because of increased digital and services industries. On the other hand, high outward investments are still being experienced in China. This we observe is because China is the major lender in BRI.

The external debt path is considered in section 4.3. It underscores the fact that Bangladesh has been registering an increase in debt

service burdens compared to China, which is both a creditor and a borrower. It further contrasts the relatively steady Indian debt profile in avoiding taking up loans with the Belt and Road Initiative.

These findings are discussed in section 4.4, with the reasons being why the two regions did not have the same results. The discussion identifies the simultaneous aspects of being a financier and an exporter that means the measures are discussed differently by China; the shrinking FDI in Bangladesh despite being a BRI member; and a different development model of services and digital investment, and selective regionalization in India.

All these sections create a systematic comparative view of the potential economic impact of BRI involvement in South Asia.

4.1. Trade exposure and import dependence

Before the Belt and Road Initiative (BRI), Bangladesh, China, and India each had their own strategies for shaping regional economies to suit their national plans. For a time in the early 2010s trade shares increased sharply, especially due to more liberal foreign-exchange policies, but the decline in 2016 was a result of structural changes in divergence: China became export-oriented, Bangladesh moved towards a different mix of production, and India made changes to its currency. These differences highlight how distinct macroeconomic condition shape each economy differently.

China, which made up about 37% of the world's manufacturing output, had a high trade-to-GDP ratio of about 37% from 2010 to 2023. This was because of large-scale production and integration into global markets. Bangladesh's trade-to-GDP ratio was between 15% and 20%, because of to its garment industry and improvements in transport and port infrastructure under the Belt and Road Initiative (BRI). India, which is not a part of BRI, expanded trade based on bilateral and regional agreements, with its emphasis on domestic production and exports. Accordingly, every country made its own trade policy according to its circumstances and the context in the region.

All the three remained importers of capital and intermediate goods as of 2023. China functioned as a regional trade hub, supplying over 25% of imports in Bangladesh, while India imported 14-16% of Chinese commodities, indicating that the two countries were not closely integrated but interdependent within the region. The gravity model indicates that openness increases with the transport and logistics infrastructure, but it only increases when the governance, customs, and institutional capacity are strong (Yu *et al.*, 2022; Djankov *et al.*, 2010). The institutionalization of the benefits of BRI is more advantageous to the countries that have it especially China (Damoah *et al.*, 2022).

To conclude, trade relations between Bangladesh, China, and India are both historical but follow different directions. China leads in volumes and network centrality; the development of exports in Bangladesh owes much to the BRI-led infrastructures, whereas in India, the country relies on internal manufacturing and external globalization without references to the BRI. These conflicting results explain how South Asian economies are becoming heterogeneous in the processes of regional and global value chain integration, and they demonstrate how the effects of BRI on the institutional and structural aspects of the economy are conditional.

4.2. Difference-in-differences descriptive statistics

This subsection examines the macroeconomic transformations associated with the Belt and Road Initiative (BRI). It compares the major trends in macroeconomic performance during the pre-2013 (pre-implementation) phase (2010–2012) with those observed during and after implementation, up to 2023. This study employs the difference-in-differences (DiD) approach to provide a descriptive assessment of the variation in the dynamics of trade, investment, and debt following the introduction of the BRI. These results are summarized in Table 2.

Table 2 summarizes the average values for both periods and presents quantitative evidence of the trends discussed above. The indicators include GDP growth, net FDI inflows (% of GDP), industry value-added (% of GDP), merchandise trade (% of GDP), and total debt service (% of GNI).

Table 2. Difference-in-Differences Descriptive Statistics (Pre- vs Post-2013)

Variable	Pre-2013 Mean	Post-2013 Mean	Difference (Post-Pre)	Std. Dev. (Pre)	Std. Dev. (Post)	Obs
Year	2011.00	2018	7.0	0.86	3.21	9 / 33
FDI net inflows (% of GDP)	2.06	1.378	−0.684	1.130	0.68	9 / 33
GDP growth (annual %)	7.31	6.242	−1.068	1.915	2.69	9 / 33
Industry, value added (% of GDP)	33.53	32.157	−1.375	9.170	5.78	9 / 33
Total debt service (% of GNI)	1.15	1.745	0.586	0.350	0.82	9 / 33
Exports of goods and services (% of GDP)	22.83	18.35	−4.48	3.52	3.88	9 / 33
Merchandise trade (% of GDP)	43.56	32.61	−10.94	4.24	5.22	9 / 33

Source: Authors's analysis and calculations

Note: Pre-BRI (2010–2012) and Post-BRI (2013–2023) comparison controls for pre-existing trends. The table variables are expressed as percentages of GDP.

Most of the indicators have shifted significantly following the initiation of the BRI. There was a downturn of 1.37% in inflows in terms of foreign direct investment as well as a decrease to approximately 6.24% in the increase of GDP. Value added in the industry declined at a moderate level, and the total debt service increased as compared to the initial post-2013. Goods and services exports were reduced by over four percentage points and the merchandise trade was slumping by almost eleven percentage points, which shows a massive deterioration in the performance of the external-sector performance in the early implementation phase.

While there has been decline in FDI and GDP growth in the initial post-2013 period, this pattern could be due to a gestational lag in benefits that typically accompanies large-scale infrastructure-led growth where the benefits will eventually surface as the project reaches its final stages (de Soyres *et al.*, 2020). Likewise, in their report on Belt and Road Economics: Opportunities and Risks of Transport Corridors, the World Bank (2019) reports that short-term fiscal and external imbalances are typical during early implementation phases; however, the long-term productivity gains typically exceed these transitory effects once full advantage of improved connectivity and logistics can be realized.

The following section examines the correlation of these variables in order to further investigate the relationship between trade, investment, and debt dynamics within the BRI framework.

4.3. Correlation analysis

To determine the relationships among various macroeconomic variables and to pretest for multicollinearity in an estimated regression, a Pearson correlation matrix was created using annual data (2010–2023) for Bangladesh, China, and India. These variables are GDP growth, FDI net inflows (% of GDP), industry value-added (% of GDP, constant prices), merchandise trade (% of GDP), total debt service (% of GNI), and year. Table 3 presents the pairwise correlation coefficients and p-values.

Table 3. Correlation Matrix of Key Variables 2010–2023

Variable	Year	FDI net inflows (% of GDP)	GDP growth (annual %)	Industry, value added (% of GDP)	Total debt service (% of GNI)	Exports of goods and services (% of GDP)	Merchandise trade (% of GDP)	Post-2013 Dummy
Year	1.0000()							
FDI net inflows (% of GDP)	−0.5467 (0.0002)	1.0000()						
GDP growth (annual %)	−0.2398 (0.1261)	0.1412 (0.3725)	1.0000()					
Industry, value added (% of GDP)	−0.0610 (0.7011)	0.4274 (0.0048)	0.2504 (0.1098)	1.0000()				
Total debt service (% of GNI)	0.3006 (0.0531)	−0.0588 (0.7116)	−0.2315 (0.1402)	−0.3460 (0.0248)	1.0000 ()			
Exports of goods and services (% of GDP)	−0.5113 (0.0005)	0.7480 (0.0000)	0.2368 (0.1310)	0.2099 (0.1822)	0.1518 (0.3371)	1.0000()		
Merchandise trade (% of GDP)	−0.7767 (0.0000)	0.5287 (0.0003)	0.3331 (0.0311)	0.2058 (0.1911)	−0.3289 (0.0334)	0.6777 (0.0000)	1.0000()	
Post-2013 Dummy	0.7125 (0.0000)	−0.3407 (0.0273)	0.1372 (0.2727)	−0.0873 (0.5825)	0.3113 (0.0448)	−0.4430 (0.0033)	−0.6742 (0.0000)	1.0000()

Source: Authors's analysis and calculations

Note: All variables are conducted annually in country terms, and the correlations are computed using in-country panel observations (N = 42).

The Pearson correlation matrix for the principal macroeconomic indicators (N = 42) is shown in Table 3, with p-values reported in brackets. FDI inflows (%) of GDP are positively and significantly associated with merchandise trade (% of GDP) (r = 0.748, p = 0.001), which means that the higher the level of foreign direct investment correspond the higher the export performance of a country. The strong FDI-export links are consistent with endogenous growth theory, which suggests that FDI helps to spread technologies, enhance productivity, and diversify exports (García-Herrero & Xu, 2017).

Conversely, merchandise trade and year are negatively correlated (r = −0.777, p = 0.001), indicating that the trade openness has been decreasing over the years. Even though the volume of both investment and trade has been growing in an absolute manner, the proportion of the merchandise trade to GDP has declined, indicating a potential move towards services and digital trade. This decline also indicates increasing external weakness, as the economies are still vulnerable to dependence

on imports and international price fluctuations.

None of the correlation coefficients was greater than 0.80, and so the multicollinearity was low, and the checks of the variance inflation factor supported this assumption. These results confirm the dataset's validity and suggest that multicollinearity bias is unlikely to affect subsequent regression estimates.

4.4. Regression results and discussion

This study examined the impact of the Belt and Road Initiative (BRI) on the economies of Bangladesh, China, and India from 2010 to 2023. The analysis employed a fixed effects difference-in-differences (FE-DiD) model. This approach compares changes over time between BRI participants (Bangladesh and China) and the non-participant country (India). This specification model estimates the impacts of the BRI on trade and investment flows using country- and year-fixed effects to capture the unobservable heterogeneity, with standard errors clustered at the country level to account for possible autocorrelation.

Table 4. Two FE DiD Models: Trade and FDI (Clustered SEs)

Variables	Trade Openness	FDI Inflows
Post-2013 × BRI Member	−2.719 (1.505)	−1.422 (0.416)*
GDP Growth (annual %)	0.286 (0.205)	−0.041 (0.051)
Industry, Value Added (% of GDP)	−0.365 (0.021)***	0.066 (0.023)
Total Debt Service (% of GNI)	−0.570 (0.483)	−0.223 (0.069)*
Constant	51.656 (0.580)	0.533 (0.854)
Year Fixed	Yes	Yes
Observations	42	42
R^2 (within)	0.947	0.751
Number of Countries	3	3

Source: Authors's analysis and calculations based on WDI and UNCTAD data

*Note: All models are Country- and Year-fixed effects. Standard errors (country clustered) are reported in parentheses. *, **, *** denote p < 0.1, 0.05, 0.01.*

The results indicate that there is a statistically significant negative impact of BRI participation on FDI inflows (β = −1.423, p < 0.10), but the impact of BRI participation on trade is not significant (β = −2.720, p = 0.213). Both models show good explanatory power (R^2 = 0.947 and 0.751). The control variables show that industrial structure has negative impacts on trade, but positive impacts on FDI, and debt service burden has a substantial negative impact on the FDI inflows.

These results invalidate the instinctive economic payoff of BRI participation and suggest that infrastructure-based benefits can only be realized over extended time spans or differ among projects. The insignificant value of the coefficient of trade is in contrast to Chen and Lin (2018), who reported that the trade elasticity during the BRI was 5-10%. Probably, this difference is explained by the fact that the South Asian region has a lower absorptive capacity and the quality of governance that limits the correlation between infrastructure spending and trade benefits due to institutional inefficiencies (Cai, 2017).

The adverse FDI reaction can be associated with the crowding-out effect and an inability to service debt incurred through massive borrowing. The challenges of rising public debt and the favoritism of state-owned projects in countries like Bangladesh and Sri Lanka may have driven out private investment, while the burden of debt repayment and exchange risk may have weakened investor confidence. These results align with those of Hurley *et al.* (2019) and Kratz *et al.* (2019), who emphasize fiscal stress and the lack of FDI spillovers in BRI projects financed by debt.

Generally, the short-term macroeconomic impact of BRI membership seems to be contingent as opposed to automatic and is influenced by the ability to govern, fiscal discipline, and institutional quality. The following sections are fundamentally based on these empirical findings, which form the basis of the robustness checks and policy implications.

4.5. Robustness test

A sequence of robustness checks was performed to ensure that the main findings are not model-dependent. First, the fixed-effects difference-in-differences (FE-DiD) model was re-estimated without year fixed effects, while retaining country fixed effects. This specification allows the main post-treatment indicator to be identified, as the country treatment dummy remains absorbed by the fixed effects. The estimation equation is as follows:

$$Y_{it} = \alpha + \beta_1 post_t + \beta(post_t \times BRI_i) + \gamma' X_{it} + \mu_i + \varepsilon_{it} \quad \text{.... (1)}$$

Where,

Y_{it} is the macroeconomic outcome (trade openness, FDI) for countries i and t ; $Post_t$= 1 for 2013-2023; BRI_i=1 for treated countries, X_{it} are control variables, μ_i is country fixed effects, and ε_{it} is the error term. Coefficient β captures the average treatment effect of BRI participation in the post-2013 period.

Table 5. Robustness Check: Country Fixed Effects Models

Variable	(1) Merchandise Trade (% of GDP)	(2) FDI Net Inflows (% of GDP)
BRI Post-2013	−10.758 (1.058)**	−0.947 (0.441)
GDP Growth (annual %)	0.516 (0.341)	−0.023 (0.056)
Industry Value Added (% of GDP)	−0.243 (0.831)	0.050 (0.077)
Total Debt Service (% of GNI)	−1.985 (1.801)	−0.241 (0.387)
Constant	48.349 (26.522)	0.961 (2.314)
Observations	42	42
R^2 (within)	0.474	0.375

Source: Author's analysis with clustered standard errors.

*Note: Significance levels: *, **, and *** denote p < 0.1, 0.05, and 0.01.*

The other estimation results are presented in Table 5. The interaction coefficient of BRI × Post-2013 was negative (−10.758 for trade and −0.947 for FDI) and the statistic was non-significant, consistent with the baseline results. The signs and magnitudes of the control variables are also similar: merchandise trade still demonstrates a positive and significant correlation (coef. 0.516; SE 0.341); however, GDP growth and debt-to-GNI did not indicate a statistically significant relationship. The value added to the industry is expected to be positive.

The fact that these coefficients remain constant shows that the fact that there is no short-run BRI effect on trade openness and FDI inflows is not an artifact of the time dummies. The diagnostics of robustness confirm this finding: the variance inflation factors (average VIF ≈ 2.2) are not large, and standard errors are concentrated at the country level, which suppresses concerns about serial correlation. Sensitivity tests were conducted with lagged treatment variables and alternative dependent measures (the trade-to-GDP ratio and net FDI % of GDP). The key finding remains the main subject of this study. The research design is strengthened by this strength test, which shows that the findings are not time sensitive to the existence or absence of time-specific controls. Even though the FE-DiD model does not allow eliminating the problem of endogeneity (e.g., unobserved confounders or reverse causality), country fixed effects manage time-invariant cross-country heterogeneity. These results could be tested in future studies through examination of timing of placebo or delayed treatment and also through equal methods.

Altogether, the insignificance of the BRI interaction term in the series of specifications is in favor of the main conclusion that the involvement of the BRI did not have a statistically significant short-term impact on trade openness or FDI inflows in the economies of South Asia from study in the period 2010-2023. This homogeneity increases the scientific reliability and policy applicability of this study's findings.

4.6. Policy implications and strategic recommendations

Considering the limited short-term effects of the BRI but the steady long-term prospective trends evident across all models, the following strategic implications are proposed. According to the empirical results, institutional capacity, fiscal discipline, and strategic alignment are important in determining the macroeconomic benefits of BRI. The relatively high performance of Bangladesh implies that the quality of governance and the degree of export diversification play a significant role, but the debt crisis in Sri Lanka helps to support the results of the regression, suggesting the threat of fiscal mismanagement. On this basis, the policy implications to the major stakeholders of the region are as follows.

4.6.1. Bangladesh: local integration and institutional strengthening

Although bri macroeconomic changes are not highly felt in South Asia in the short run, they have been identified as shaping regional trade and investment relations. Divergent national experiences indicate the relevance of administrative capability, governance systems, and a connection with broader national development agenda.

Bangladesh should capitalize on BRI investments by fostering stronger domestic connections and maximizing long-term benefits.

• *Local Enterprise Participation:* Bangladeshi firms are to have a given percentage of subcontracts in the BRI projects activities allocated to them as joint partners, through technology licensing or supplier contracting. A viable domestic capacity can be empowered by a pool of vetted local contractors and enhance spillovers.

• *Skills and Technology Transfer:* Design vocational cooperation with the Chinese state-owned businesses (SOE) to teach the Bangladeshi engineers, technicians, and managers the skills related to logistics, construction, and project management.

• *Debt and Procurement Reforms:* Debt and procurement reform should be considered under a single system of public investment management to evaluate the fiscal risk, economic returns as well as procurement transparency-based on wider debt and procurement reform schemes.

4.6.2. China: Reforming the BRI Financing Model

As the principal BRI actor, China has both the influence and responsibility to strengthen development outcomes by reforming financing and management systems.

• *Risk-sharing mechanisms:* Privatise blended financing with multilateral financial institutions such as the Asian Infrastructure Investment Bank (AIIB) or regional development banks, instead of using high-interest bilateral loans. This would create moderate and sustainable risk management.

• *Equity Partnerships:* Chinese companies need to be encouraged to make minority equity investments in BRI ventures instead of the debt-intensive models which would lessen the repayment obligations and enhance accountability.

• *Ex-Post Project Monitoring:* Have joint monitoring systems with host-country officials to monitor the delivery of the project, maintenance of the project, and the social and environmental effects of the project upon post-constructions.

4.6.3. India: Leveraging Parallel Infrastructure Frameworks

The move by India to stay out of the BRI gives it strategic flexibility and policy dilemmas. India must foster similar structures to support the growth of BRI-related structures in the neighboring states to maintain regional engagement and connectiveness.

• *Upgrade Chabahar and INSTC Corridors:* Accelerate the rollout of the Chabahar Port-Afghanistan-Central Asia Corridor and the International North-South Transport Corridor (INSTC) in order to have competitive transport options between India, Iran, and Central Asia.

• *Digital and Energy Connectivity:* Lead regional cooperation on digital infrastructure and energy grid synchronization with neighboring economies such as Bangladesh, Bhutan, and Nepal (BBIN) to enhance cross-border electricity trade and digital linkages.

• *Private Sector-Led Projects:* Foster public-private partnerships (PPP) of transport and logistics hubs through the Gati Shakti National Master Plan and Viability Gap Funding program and use the power of private capital to provide regional connectivity.

4.6.4. Regional Cooperation: Institutional Anchoring and Norm Harmonisation

The South Asian economies must have more institutional coordination and harmonisation of norms to enable the full potential of the BRI.

• *Debt Transparency and Fiscal Coordination:* South Asian countries are advised to engage in regional cooperation by establishing BIMSTEC or SAARC to create a single sovereign debt database. This would enable governments to follow and reveal terms of debts, repayment plans and contingent liabilities and enhance accountability as well as minimise fiscal risks.

• *Procurement and Environmental Standards:* Develop a sovereign debt database in the region, either under the BIMSTEC or SAARC, to monitor the loan conditions, repayment schedule, and contingent liability. This would increase financial responsibility and reduce distress in debt.

• *Value Chain Integration:* The infrastructure and the tools of trade facilitation through single window platform and electronic customs system should support the production clusters in the region in materials like textile, pharmaceutical and electronics. The connections will contribute to the competitiveness and engagement of South Asia in the global value chains.

Overall, to optimize the developmental gains of the BRI, South Asian economies need to integrate institutional reform, regional coordination as well as fiscal transparency, and China needs to enhance sustainability by financing reform and building local capacity. All these recommendations should be implemented by the collective and this would make the initiative contribute to inclusive and resilient growth within the region.

5. CONCLUSION

This paper analyzed the overall developmental implications of the Belt and Road Initiative (BRI) in the three South Asian economies that have strategic differences between them: Bangladesh, China, and India. Despite the fact that the short-term macroeconomic impacts of BRI participation are quite narrow, the initiative is slowly transforming the trade, investment, and connectivity environment of the region. The magnitude of such gains is highly reliant on the quality of governance, fiscal management and institutional capacity, which will dictate whether institutional led growth will support long-term development or worsen structural vulnerabilities.

The comparative study reveals that national performance is quite different. The greatest contributor to external infrastructure financing, China, shows the ability to gather resources in large amounts, but, there is the issue of satisfying the needs of the fast-growth and self-sufficiency in the economy. The BRI seems to have two implications in Bangladesh, one of which enables the nation to enhance its logistics and availability of more foreign capital, and the other one burdens the nation by raising the cost and the debt issue. The non-BRI strategy of India is in contrast using the policies of the assumption that sustainable long-term growth cannot be achieved by institutional reform alone but by proactive domestic policies of industry and regionally-oriented policies of connectivity.

The findings have a number of valuable lessons. First, there is a likelihood of inefficiency in infrastructure projects that are implemented without proper institutional capacity, which may eventually lead to debt distress. Second, efforts that are being externally funded require the integration of open governance institutions and local inclusion so as to maximize development spillovers. Third, the economic benefits of the cross-border connectivity may be enhanced by coordinating the regions in terms of investment standards, debt-management, and value-chain integration.

Comparison analysis reveals that the national results are highly differentiated. The greatest contributor to external infrastructure financing, China, shows the ability to gather resources in large amounts, but, there is the issue of satisfying the needs of the fast-growth and self-sufficiency in the economy. The BRI seems to have two implications in Bangladesh, one of which enables the nation to enhance its logistics and availability of more foreign capital, and the other one burdens the nation by raising the cost and the debt issue. The non-BRI strategy of India is in contrast using the policies of the assumption that sustainable long-term growth cannot be achieved by institutional reform alone but by proactive domestic policies of industry and regionally-oriented policies of connectivity.

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