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*Md. Monirul Islam* [a)], *Mohammad Tareque* [b)], *Md. Moniruzzaman* [c)], *Md. Idris Ali* [d)]
[a)] Ural Federal University, Ekaterinburg, Russian Federation
[a, b, c)] Bangladesh Institute of Governance and Management, Dhaka, Bangladesh
[d)] Ryerson University, Toronto, Canada

# ASSESSMENT OF EXPORT-LED GROWTH HYPOTHESIS: THE CASE OF BANGLADESH, CHINA, INDIA AND MYANMAR[1]

**Abstract.** The Asian countries, particularly Bangladesh, China, India and Myanmar, have been witnessing impressive economic growth rates due to their trade performance in the international market. Although export-led growth assumption is functional in these economies, existing pieces of literature hardly considered them in their studies. Against this backdrop, the present study investigates the export-led growth hypothesis for four South Asian countries — Bangladesh, China, India, and Myanmar — covering country-specific different time ranges. This research employs the autoregressive distributed lag (ARDL) bounds testing approach to co-integration and the MWALD Granger causality test to determine the causal relationship between variables. The results obtained from the autoregressive distributed lag method confirm the co-integration among the variables. In addition, the Granger causality test explores both the export-led and growth-led export hypotheses in Bangladesh and India as per the bidirectional causation between exports and economic development. Only the export-led growth theorem is relevant to China, and the growth-led export hypothesis is valid in the case of Myanmar based on the unidirectional causation between these variables. Therefore, any joint footstep of BCIM countries is critical to promoting exports by penetrating new destinations with diversified export goods and services. The obtained findings also indicate the potential for utilising these countries' unused resources to encourage exports to uplift the existing growth trajectory.

**Keywords:** export-led growth, growth-led export, economic growth, ARDL method, MWALD Granger causality test, BCIM countries

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ИССЛЕДОВАТЕЛЬСКАЯ СТАТЬЯ

*М. М. Ислам* [а] ✉, *М. Тареке* [б], *М. Монируззаман* [в], *М. И. Али* [г]
[а] Уральский федеральный университет, г. Екатеринбург, Российская Федерация
[а, б, в] Бангладешский институт управления и менеджмента, г. Дакка, Бангладеш
[г] Университет Райерсона, г. Торонто, Канада

# Оценка модели экспортоориентированного роста (на примере Бангладеш, Китая, Индии и Мьянмы)

**Аннотация.** Страны Азии, а в особенности Бангладеш, Китай, Индия и Мьянма, демонстрируют впечатляющие темпы экономического роста за счет показателей торговли на международном рынке. В научной литературе признано, что в этих странах реализована модель экспортоориентированного роста, однако рассмотрению самих этих моделей уделяется недостаточно внимания. В настоящей статье представлено исследование модели экспортоориентированного роста в четырех странах Южной Азии — Бангладеш, Китае, Индие и Мьянме — в различные промежутки времени. Для тестирования коинтеграции и определения причинно-следственной связи между переменными в ходе анализа были использованы модель авторегрессии и распределенного лага (ARDL) и модифицированный тест Вальда на причинность Грейнджера. Применение метода ARDL подтвердило коинтеграцию переменных. Кроме того, тест на причинность по Грейнджеру свидетельствует о двунаправленной связи между экспортом и экономическим развитием в Бангладеш и Индии, подтверждая наличие двух моделей экономического развития — роста за счет экспорта и экспорта за счет роста. Учитывая однонаправленную связь между переменными, можно утверждать, что в Китае росте происходит за счет экспорта, а в случае Мьянмы экспорт осуществляется за счет роста. Таким образом, страны экономического коридора Бангладеш — Китай — Индия — Мьянма должны совместно принять меры для продвижения экспорта, развития новых направлений и диверсификации экспортных товаров и услуг. Полученные результаты также указывают на возможность использования незадействованных ресурсов стран для развития экспорта и усиления экономического роста.

**Ключевые слова:** рост за счет экспорта, экспорт за счет роста, экономический рост, модель авторегрессии и распределённого лага, модифицированный тест Вальда на причинность Грейнджера, экономический коридор Бангладеш-Китай-Индия-Мьянма

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## Introduction

The export-led growth (ELG) hypothesis is hardly a new area of investigation in the empirical works of literature on international trade and development. Causality running from exports to economic growth is considered export-led growth in which the growth of a country is measured by its ability to export (Tang, Lai, Ozturk, 2015). From this point, the relationship between international trade and economic growth, especially exports and economic growth, is evident, which is investigated by the researchers at length following neoclassical economists' view. Their view supports exports as the main driver of economic growth. Helpman and Krugman (1985) stated that export promotion accelerates economic growth via economies of scale —specialisation in production and technology knowledge dissemination. Similar to this view, Easterly (2007) posited that exports, in addition, boost up economic efficiency through proper allocation of resources for stimulating economic growth in the long run. Apart from ELG hypothesis, growth-led export (GLE) theorem is supported by Bhagwati (1988) in line with neoclassical trade theory. He opined that economic growth spurs both the demand and supply sides of an economy. Thus, economic growth improves the array of skills and technological progress. These two indicators contribute to productive efficiency and generate a comparative advantage for an economy.

Economic growth enhances labour productivity by improving their skills. From this point, la-

bour productivity is considered one of the significant determining factors of export promotion (Arnold, Hussinger, 2005; Melitz, Ghironi, 2007). So, labour productivity as the supply side factor of export growth also stimulates economic growth. Besides, trade, predominantly exports promotion, depends on the governance phenomenon. Quality of governance helps a country to be free from political uncertainty. Mainly developing countries face different forms of destructive governance phenomena like human rights violations terrorism, which ultimately pushes for political instability. Jung (2017) expressed that international trade literature highlights domestic political instability as a fundamental source of uncertainty for trade agreements. There are two-fold effects of trade policy uncertainty. Firstly, trade policy uncertainty emanated from political unrest discourages partner countries and buyers to investment in host economy's industries and other employment generating sectors (Mölders, 2016). Therefore, there might be the possibility of terminating the trade agreements signed between those forces due to political instability. Secondly, the uncertainty hampers the access of potential exporters to new markets (Handley, 2014). Even political instability makes the industries of export-produced commodities dysfunctional as labours become unwilling to work amid the unstable situation within a country. Any obstacle in production ultimately contributes to lowering growth in the economy. Therefore, the ELG hypothesis cannot work correctly in an unstable or bad governance situation.

Apart from internal dynamics, the exchange rates issue is one of the determining factors to promote a country's exports. As depreciation in local currency occurs in export-dependent economies, the export competitiveness is increased due to the deterioration of the exchange value of domestic currencies compared to importers' money (Islam et al., 2022). Thus, the investigation of export-led growth (ELG) or growth-led exports (GLE) hypotheses can hardly be appropriate without considering the factors, such as labour force, political uncertainty issue and exchange rates for any economy.

For decades, economies dependent on exports, such as Malaysia, South Korea, Thailand, Vietnam, Hong Kong, etc., have achieved remarkable success in improving their economic growth (Tang, Lai, Ozturk, 2015). BCIM forum (Bangladesh, China, India and Myanmar) follows the same way to generate impressive economic growth. As a Track-II initiative of these countries, this forum floated in 1999, aiming to build a Regional Economic Development Area (REDA) to hasten economic growth by utilising the region's unused resources (ESCAP, 2002). Based on regional cooperation and inner mechanisms, China and India have already achieved rapid economic growth by expanding their trade primarily by exports (Stiglitz, 2007). Bangladesh has been the 54th largest export economy globally (ECI, 2019), aiming to materialise its vision to be a developed economy by 2041. Myanmar is also the 75th largest export economy globally (ECI, 2019). This economy also intends to achieve impressive economic growth by promoting its exports. This export growth scenario of BCIM economies motivates this research on the nexus between export promotion and economic development within the impact and causation-based econometric framework.

Export-dependent countries seemed to be vulnerable during the global financial crisis in 2008–2009, when major developed economies had a shattering effect on these countries. As the export-dependent economies witnessed global depression acrimoniously, now questions arise on how export-led growth policy remains viable in these countries (Tang, Lai, Ozturk, 2015). In this situation, this paper attempts to check the stability of the export-led growth (ELG) hypothesis in BCIM countries by incorporating exchange rates, total labour and political uncertainty issue as control variables. Furthermore, we use the autoregressive distributed lag (ARDL) bounds testing approach to co-integration and the MWALD Granger causality test developed by (Toda, Yamamoto, 1995).

This study contributes to the prevailing works of literature in five ways. First, this study extraordinarily selects the BCIM forum, which was not considered by the earlier studies in proving the ELG theorem. Second, this study attempts to explore both the ELG (export-led growth) and the GLE (growth-led export) hypotheses using the MWALD-based causal analysis procedure that illustrates a novel method applied. Third, the use of country-specific separate time ranges for analysis purposes is uncommon in the earlier pieces of economic literature in exploring the nexus between exports and economic growth in the case of BCIM economies. Fourth, the individual country-specific investigation is a novel approach, as done in this study. Finally, striving to discover the two-way relationship, i. e. ELG (export-led growth) and GLE (growth-led export) within the purview of the exchange rate, labour productivity, and political uncertainty is also rare in the case of BCIM countries.

The study is novel in terms of choosing sample countries. No previous studies considered the

Bangladesh, China, India and Myanmar (BCIM) Forum within the framework of export-income growth nexus. Therefore, the representation of relative findings in this study is also scarce in the context of the BCIM Forum. Besides, no previous research utilised the labour productivity and governance measure (political uncertainty) variable to explore the nexus between income growth and exports for this economic block. Moreover, this study unveils that the BCIM block upholds both the ELG (Export-led growth) and GLE (Growth-led export) scenarios across their developmental way, which is the novel findings in the case of the BCIM Forum. Besides, this study establishes the proof of the ARDL-based co-integration findings using the MWADL test-driven Granger causality test. Finding the identical results by applying two separate econometric tools/methods illustrates the novelty of this study and its findings. Therefore, this study's novel findings can provide the policymakers of this economy with critical insight into helping this forum to develop export size and diversify export commodities in the international markets. Moreover, it will invariably enable this block to compete with developed countries and survive subtly in the global markets.

The remainder of this study is organised as follows. Section 2 deals with the scenarios of exports and GDP in BCIM countries, and Section 3 reviews some extant literature. Section 4 represents the data and econometric techniques. Finally, section 5 portrays the empirical results while this study's conclusion and policy recommendations are placed in Section 6.

## Export-Growth Scenario in BCIM Countries

The BCIM Economic Corridor is a modern form of the ancient Silk Road and a review of the 1999 Track-II Kunming initiative among Bangladesh, China, India and Myanmar. The total geographical area of the BCIM forum is about 9 % of the world, with a population constituting approximately 40 percent of the world. The BCIM concept drew its motivation from the idea of 'Growth Zones,' which blends resources of the neighbouring countries to expedite the economic growth of the member countries. Using the concept of 'Growth Zones,' these countries aimed to achieve the opportunities: connectivity and infrastructure, energy resources, agriculture, trade and investment, etc. (Rahman et al., 2007).

The outcome of regional economic integration (REI) is significantly noticeable regarding their contribution to the regional and world economy. Now, the GDP of these four integral countries is about 15 percent of the total GDP of the world (Bank, 2014). In 2013, the BCIM trade comprised 14 percent of the international trade, and common shares of exports and imports of this forum in the global market are calculated at 14 percent and 13 percent (Islam, Matin, Hossan, 2015). Figure 1 portrays the movement of gross domestic product (GDP) and exports of BCIM countries over this study's analysis period.

## Review of Extant Literature

The existing empirical studies may be categorised into three strands based on availability. Among these, the first cluster includes Maizels (1963); Kravis (1970); Heller and Porter (1978); Tyler (1981) and Rana (1986) that used cross-country data and rank correlation method to examine the export-led growth (ELG) hypothesis.

The second cluster represents the works of literature, e. g., Emery (1967); Jay and Michalopoulos (1973); Voivodas (1973); Williamson (1978); Salvatore (1983); Balassa (1985); Ram (1985); Singer and Gray (1988); Mbaku (1989); Fosu (1996); Otani and Villanueva (1990); Alam (1991); Dodaro (1991); De Gregorio (1992); Dodaro (1991); Sheehey (1992); Weaver (1993); Coppin (1994); Amirkhalkhali and Dar (1995); Yaghmaian and Ghorashi (1995); McNab and Moore (1998), which also employed cross-country data by using different regression methods, such as ordinary least squares (OLS), two stage least squares (2SLS), three stage least squares (3SLS) models and panel data method.

The last cluster of researchers used the autoregressive distributed lag (ARDL) model to investigate the export-growth nexus. For example, Shan and Sun (1998) examined the ELG hypothesis in the case of China employing monthly data and explored a bidirectional causal relationship between export growth and economic growth. Mah (2005) used the same model and discovered a long-run relationship with bidirectional causality between export growth and real GDP growth. Also, in the last decade, there appeared many works of literature that supported the ELG hypothesis, including Parikh and Stirbu (2004), Al Mamun and Nath (2005), Maneschiöld (2008), and Herrerias and Orts (2011).

Recent two studies drew insightful attention to the economic literature by examining the ELG hypothesis in the context of Asian countries. First of all, Hye, Wizarat and Lau (2013) explored the trade-growth nexus using the ARDL approach using data from six Asian countries, e.g. Bangladesh, India, Pakistan, Sri Lanka, Nepal and Bhutan, over different periods. Using the modified Granger Causality test, the study found ELG hypothesis

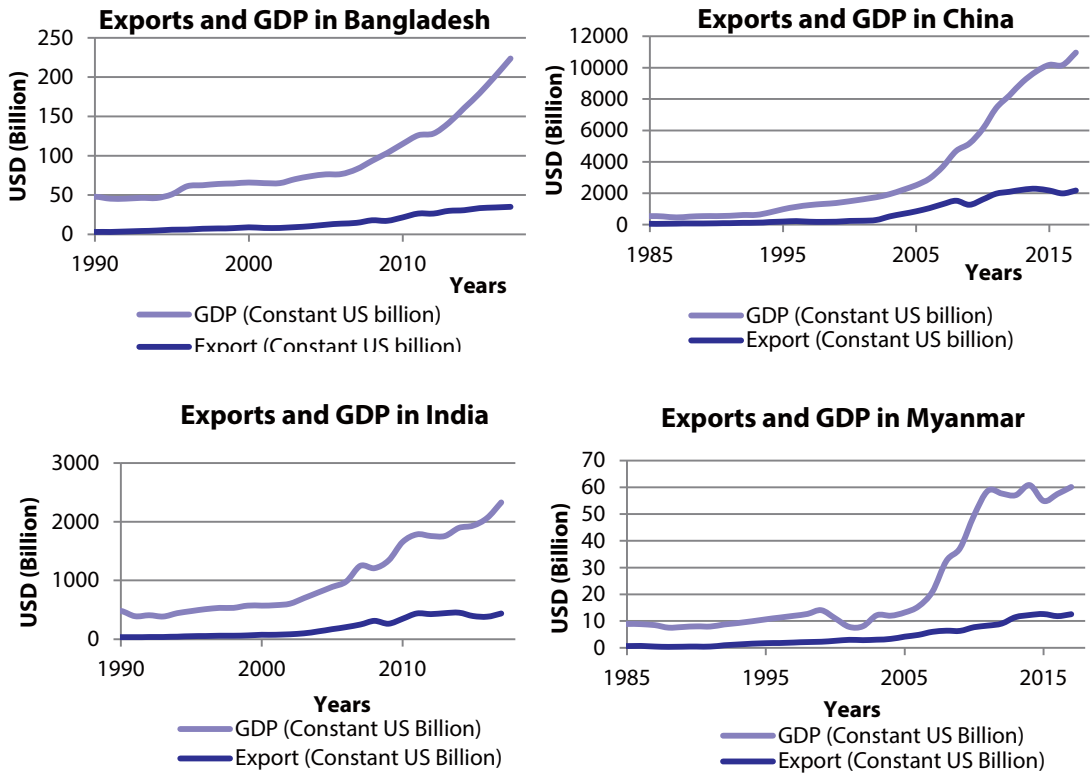


**Fig. 1:** *Exports and GDP Growth in BCIM Countries (source: World Bank Development Indicators (WDI), 2018)*

relevant to all the countries except Pakistan, while the import-led growth model is appropriate to this country. Secondly, Tang, Lai and Ozturk (2015) re-investigated the ELG hypothesis for Asia's Four Little Dragons using co-integration and rolling causality analyses. Using both bivariate (exports and GDP) and trivariate (exports, GDP and exchange rate) models, the study found that exports and GDP are co-integrated for all four economies, indicating a long-run relationship between the variables. Still, the rolling regression-based MWALD test discovered that the ELG hypothesis is not stable in each of the four economies over their respective analysis period.

Based on the review of the aforementioned literature, there is a good number of empirical shreds of evidence that examined both the co-integration and causal relations between exports and economic growth in the context of different countries. However, the country-specific examination of the ELG hypothesis on BCIM economies by incorporating exchange rate, labour productivity and political uncertainty as control variables is scarce in econometric literature. Thus, our study can add value to the development literature by investigating the ELG theorem in BCIM countries.

## Data, Model and Methods

This research considers annual time series data for BCIM countries to investigate the association among the variables. The study period varies from one country to another based on data availability. For Bangladesh, the analysis period counted is from 1990 to 2018; China from 1985 to 2018; India from 1990 to 2018; and Myanmar from 1985 to 2018. In this study, the dependent variable is real GDP (LnGDP), which measures an economy's size and total output. The independent variables are real exports (LnEX), the real exchange rate (LnEXCH), total labour (LnLAB) and the political uncertainty variable capturing political terror scale (LnPTS). The study chooses exports as the significant determinant of economic growth in BCIM countries because exports promote income growth through economies of scale, including production mechanisms and technology transfer (Helpman, Krugman, 1985). Besides, export promotion strengthens proper resource allocation in boosting economic efficiency (Easterly, 2007). The choice of the exchange rate is also rational because the exchange rate affects economic growth. Exchange rate depreciation increases the export volumes of the source countries and vice versa. Therefore, the export-income growth nexus becomes futile without considering the exchange rate as the variable in the study's model. This study also takes labour productivity as a significant indicator of economic growth. The quantity and quality of the labour class augment the scale of production and income growth of an economy.

More importantly, the labour skills in using technology operation in the production process spur the economic growth. Finally, considering the political terror scale (PTS) as an influential phenomenon of economic growth is logical to incorporate in our study. Ultimately, the institutional quality largely depends on how a country controls the level of terrorism done by the different separatist forces. Sometimes, a state's coercive measure against people becomes part of terror practice (Islam, Islam, 2021). Therefore, the terror practice-laden volatile situation constrains the production process and GDP growth. The data of real GDP, real exports and total labour are sourced from the World Bank Development Indicators (WDI, 2019); and real exchange rates are collected from FAOSTAT Data and Penn World Table. Besides, the data of political terror scale (PTS) is taken from Gibney et al. (2019). First, the current data of GDP and exports for Bangladesh, China, India and Myanmar (BCIM) are converted into real data using the US GDP deflator (base year 2016). Then, all these data are transformed into natural logarithm form. The logarithmic transformation is a suitable way of transmuting a much-skewed variable into more standardised data properties. In the regression analysis, the natural-log scale's coefficients can be interpreted as approximate proportional changes in the variables (Shahbaz et al., 2016). The functional association between exports and all other variables in BCIM countries is shown as follows:

$$\ln GDP = f(\ln EX, \ln EXCH, \ln LAB, \ln PTS),$$

where ln*GDP* is the real *GDP*, ln*EXCH* represents the real exchange rates, ln*LAB* denotes the total labour, ln*PTS* is the political terror scale. Before implementing time series data properties, a stationarity test is mandatory to know about the nature of the data (Ewing, Sari, Soytas, 2007).

Then we check the stationary status of all the variables by using the Dickey and Fuller (1979) and the Kwiatkowski—Phillips—Schmidt—Shin (Kwiatkowski et al., 1992) tests. As the variables are of mixed order of integration, i. e., I(0) and I(1), this stationarity status of the variables allows to run the ARDL bounds testing approach to co-integration (Pesaran, Shin, 1998; Pesaran et al., 2001). The ARDL model encompasses many advantages over conventional co-integration testing techniques. First of all, this method can be applied whether the variables are of mixed orders of integration, e.g. I(0) and I(1). Secondly, it is possible to estimate both the short-run and long-run relationship among the variables simultaneously by using the ARDL procedure. Besides, the endogeneity issue is checked by the ARDL model, including lags of dependent and independent variables in the model. The ARDL model can be written as follows:

$$\begin{aligned}\ln GDP_t = \alpha + \sum_{i=1}^{n_1}\gamma \ln GDP_{t-i} + \\ + \sum_{i=0}^{n_2}\beta_1 \ln EX_{t-i} + \sum_{i=0}^{n_3}\beta_2 \ln EXCH_{t-i} + \\ + \sum_{i=0}^{n_4}\beta_3 \ln LAB_{t-i} + \sum_{i=0}^{n_5}\beta_4 \ln PTS_{t-i} + \varepsilon_t, \end{aligned} \quad (1)$$

where ln*GDP*, ln*EX*, ln*EXCH*, ln*LAB* and ln*PTS* are the considered variables of the study; is the white noise term. We can implement the bound test by transforming Eq. 1 into a bound testing equation to include short-run and long-run dynamics. The co-integration of the bounds testing procedure directs us to perform *F*-test for selecting optimal lag length within the set ARDL bounds testing equation. We choose the appropriate lag length based on Akaike Information Criterion (AIC). The standard *F*-test (Pesaran et al., 2001) confirms the existence of co-integration, which encompasses two sets of critical values — lower and upper — for the bounds test. The lower and upper critical values include the assumptions of all considered variables in the study to be I(0) and I(1) correspondingly. Suppose the calculated *F*-statistics from the bounds testing equation stays above the upper bound. In that case, the null hypothesis of no co-integration is rejected, and if it stays under the lower bound, the test does not accept the alternative hypothesis of co-integration. Besides, if the computed values of *F*-statistics remain between the lower and upper bounds, we consider the result inconclusive. After confirming the long-run relationship, we can proceed to estimate short-run dynamics converting Eq. 1 into an error correction mechanism (ECM) as follows:

$$\begin{aligned}\Delta \ln GDP_t = \alpha + \sum_{i=1}^{n_1}\gamma \Delta \ln GDP_{t-i} + \\ + \sum_{i=0}^{n_2}\beta_1 \Delta \ln EX_{t-i} + \sum_{i=0}^{n_3}\beta_2 \Delta \ln EXCH_{t-i} + \\ + \sum_{i=0}^{n_4}\beta_3 \Delta \ln LAB_{t-i} + \sum_{i=0}^{n_5}\beta_4 \Delta \ln PTS_{t-i} + \\ + \delta EC_{t-1} + \varepsilon_t, \end{aligned} \quad (2)$$

where δ represents the speed of adjustment; captures disequilibrium; and the first difference operator. The coefficient of error correction mechanism (ECM) implies the speed of readjustment from short-run disequilibrium to long-run equilibrium. In this way, the causal relationship is

assumed by the statistically significant coefficient value of ECM δ, which is the negative sign (Shahbaz et al., 2017).

Diagnostic tests of the model are essential as some assumptions of the ARDL procedure, such as errors, maybe serially independent and abnormally distributed. The Breush-Godfrey serial correlation LM test and Jarque-Bera tests are applied to check serial independence and normality, respectively, in the model. Besides, the ARCH test is employed to prevent the heteroskedasticity issue in the model. The Ramsey Reset test is also performed to know the existence of any misspecification in the model. Following Brown, Durbin and Evans (1975) and Pesaran and Shin (1998), CUSUM and CUSUM of squares tests are executed to determine any autoregressive structure existed in the model. The parameter stability of the model is also checked by using these tests.

Considering the causal effect and mixed order of integration, the study utilises the Modified Wald (MWALD) test developed by Toda and Yamamoto (1995). To exercise this test, they apply a standard VAR model when variables are of mixed order of integration, e.g. I(0) and I(1) (unlike traditional Granger causality test). Therefore, it signifies that the method reduces the risk of variables' order of integration identified wrongly (Mavrotas, Kelly, 2001). In this case, the MWALD test is more effective due to its simplicity. To utilise this test, we first select the appropriate lag order and the maximum integration order ($d_{max}$) to be estimated into the augmented-VAR approach. Then, to execute the MWALD test, we calculate the augmented-VAR method for our model as follows:

$$\begin{bmatrix} \ln GDP_t \\ \ln EX_t \\ \ln EXCH_t \\ \ln LAB_t \\ \ln PTS_t \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \\ \alpha_4 \\ \alpha_5 \end{bmatrix} + \begin{bmatrix} A_{11,1} & A_{12,1} \\ A_{21,1} & A_{22,1} \\ A_{31,1} & A_{32,1} \\ A_{41,1} & A_{42,1} \\ A_{51,1} & A_{52,2} \end{bmatrix} \times \begin{bmatrix} \ln GDP_{t-1} \\ \ln EX_{t-1} \\ \ln EXCH_{t-1} \\ \ln LAB_{t-1} \\ \ln PTS_{t-1} \end{bmatrix} + \cdots + \begin{bmatrix} A_{11,k} & A_{12,k} \\ A_{21,k} & A_{22,k} \\ A_{31,k} & A_{32,k} \\ A_{41,k} & A_{42,k} \\ A_{51,k} & A_{52,k} \end{bmatrix} \times \begin{bmatrix} \ln GDP_{t-k} \\ \ln EX_{t-k} \\ \ln EXCH_{t-k} \\ \ln LAB_{t-k} \\ \ln PTS_{t-k} \end{bmatrix} +$$

$$+ \begin{bmatrix} A_{11,p} & A_{12,p} \\ A_{21,p} & A_{22,p} \\ A_{31,p} & A_{32,p} \\ A_{41,p} & A_{42,p} \\ A_{51,p} & A_{52,p} \end{bmatrix} \times \begin{bmatrix} \ln GDP_{t-p} \\ \ln EX_{t-p} \\ \ln EXCH_{t-p} \\ \ln LAB_{t-p} \\ \ln PTS_{t-p} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \\ \varepsilon_{3t} \\ \varepsilon_{4t} \\ \varepsilon_{5t} \end{bmatrix}, \quad (3)$$

where $GDP_t$ represents the real *GDP*, $EX_t$ denotes the real exports, $EXCH_t$ presents the real exchange rate, $\ln LAB_t$ illustrates the total labour and $PTS_t$ is the political terror scale. $k$ is the appropriate numbers of lag, which is determined by the Akaiike Information Criterion (AIC). Here the lag order $p$ generally represents $(k + d_{max})$. We use $d_{max} = 1$ since it functions better than any other $d_{max}$ order (Dolado, Lütkepohl, 1996). $\varepsilon_{1t}$, $\varepsilon_{2t}$, $\varepsilon_{3t}$ and $\varepsilon_{4t}$ are residuals, which are supposed to be spherically distributed and error terms. From this test, it is found that export-led growth is not stable if the null hypothesis 'exports do not Granger-cause GDP' is not rejected at the usual level of significance. In addition, $d_{max}$ as the extra lag in Eq. 3 is considered unrestricted because the critical values of asymptotic $\chi^2$-distribution can be applied while the causality test is performed on the non-stationary variables (Toda, Yamamoto, 1995).

## Empirical Results and Discussions

This section represents the empirical results concerning the descriptive statistics of the variables, the stationarity tests, the ARDL bounds testing co-integration method and the Modified WALD (MWALD) causality test.

Table 1 notices the descriptive statistics of the logarithmic variables utilised in our study's models. It is found that the mean and standard deviation values of GDP (dependent variable) are higher, which implies that it diverges within a slight pose over time and throughout the selected sample countries. Besides, the independent variables, including exports (LnEX) and labour productivity (LnLAB), have higher mean and standard deviation values, indicating a lower efficiency level with average changeability throughout the sample countries. Another two independent variables, i. e., the exchange rate (LnEXCH) and political terror scale (LnPTS), belong to a moderate efficiency level and variability over the years and across the panel countries with more or less lower mean and standard deviation values. More importantly, the standard deviation values of all these variables of this study are lower than their mean values, meaning the normal distribution of the data.

Table 1

**Descriptive statistics**

| | *Bangladesh (1990-2018)* | | | | | *China (1985-2018)* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Statistics | ln*GDP* | ln*EX* | ln*EXCH* | ln*LAB* | ln*PTS* | ln*GDP* | ln*EX* | ln*EXCH* | ln*LAB* | ln*PTS* |
| Mean | 25.25 | 23.20 | 4.05 | 17.71 | 1.32 | 28.43 | 26.81 | 1.85 | 20.39 | 1.28 |
| Median | 25.11 | 22.97 | 4.08 | 17.74 | 1.38 | 28.23 | 26.41 | 1.91 | 20.42 | 1.38 |
| Maximum | 26.28 | 24.37 | 4.42 | 18.04 | 1.38 | 30.18 | 28.55 | 2.15 | 20.48 | 1.60 |
| Minimum | 24.62 | 21.84 | 3.54 | 17.33 | 1.09 | 26.94 | 24.71 | 1.07 | 20.19 | 0.69 |
| Std. Dev. | 24.62 | 21.84 | 0.28 | 0.20 | 0.11 | 1.11 | 1.34 | 0.29 | 0.09 | 0.17 |
| Obs. | 29 | 29 | 29 | 29 | 29 | 34 | 34 | 34 | 34 | 34 |
| | *India (1990-2018)* | | | | | *Myanmar (1985-2018)* | | | | |
| Mean | 27.61 | 25.72 | 3.75 | 19.85 | 1.40 | 23.82 | 21.81 | 5.49 | 16.90 | 1.46 |
| Median | 27.49 | 25.68 | 3.81 | 19.90 | 1.38 | 23.52 | 21.88 | 6.21 | 16.95 | 1.38 |
| Maximum | 28.57 | 26.95 | 4.22 | 20.05 | 1.60 | 24.93 | 23.42 | 7.26 | 17.03 | 1.60 |
| Minimum | 26.77 | 24.32 | 2.86 | 19.57 | 1.38 | 22.86 | 19.74 | 2.13 | 16.66 | 1.09 |
| Std. Dev. | 0.61 | 0.97 | 0.32 | 0.14 | 0.06 | 0.69 | 1.14 | 1.69 | 0.11 | 0.12 |
| Obs. | 29 | 29 | 29 | 29 | 29 | 34 | 34 | 34 | 34 | 34 |

Table 2

**The ADF and KPSS stationarity tests**

| Economies | *ADF* | | | | | *KPSS* | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | $\ln EX_t$ | $\ln GDP_t$ | $\ln EXCH_t$ | $\ln LAB_t$ | $\ln PTS_t$ | $\ln EX_t$ | $\ln GDP_t$ | $\ln EXCH_t$ | $\ln LAB_t$ | $\ln PTS_t$ |
| Bangladesh | −1.01 (0) | −1.01 (1) | −1.34 (2) | −2.24 (0) | −1.14 (3) | 0.68 (4)** | 0.66 (4)** | 0.67(4)** | 0.69 (4)** | 0.70 (0)** |
| China | −1.25 (0) | −0.05 (1) | −4.01 (4)*** | −3.36 (8)** | −3.22 (0)** | 0.66 (5)** | 0.65 (5)** | 0.33 (4) | 0.63 (5)** | 0.63 (2)** |
| India | −0.61 (0) | −2.11 (4) | −3.82 (0)*** | −1.44 (1) | −2.75 (3)* | 0.66 (4)** | 0.66 (4)** | 0.64 (4)** | 0.67 4)** | 0.31 (2) |
| Myanmar | −0.18 (0) | −0.58 (1) | −3.18 (0)** | −3.22 (5)** | −5.01 (0)*** | 0.64 (5)** | 0.48 (5)** | 0.62 (5)** | 0.63 (5)** | 0.10 (3) |
| Economies | *ADF* | | | | | *KPSS* | | | | |
| | $\Delta\ln EX_t$ | $\Delta\ln GDP_t$ | $\Delta\ln EXCH_t$ | $\Delta\ln LAB_t$ | $\Delta\ln PTS_t$ | $\Delta\ln EX_t$ | $\Delta\ln GDP_t$ | $\Delta\ln EXCH_t$ | $\Delta\ln LAB_t$ | $\Delta\ln PTS_t$ |
| Bangladesh | −5.50 (0)*** | −3.45 (0)** | −4.24 (1)*** | −1.22 (1) | −10.98 (2)*** | 0.11 (2) | 0.51 (2)** | 0.30 (7) | 0.32 (4) | 0.28 (15) |
| China | −4.97 (0)*** | −3.92 (1)*** | −4.77 (0)*** | −1.09 (7) | −8.48 (0)*** | 0.21 (3) | 0.25 (3) | 0.57 (3)** | 0.64 (5)** | 0.37 (24)* |
| India | −4.23 (0)*** | −5.94 (0)*** | −4.74 (0)*** | −1.73 (0) | −8.27 (2)*** | 0.14 (3) | 0.24 (1) | 0.33 (3) | 0.33 (4) | 0.05 (0) |
| Myanmar | −4.42 (0)*** | −3.35 (0)** | −3.66 (0)*** | −0.85 (5) | −7.84 (1)*** | 0.08 (2) | 0.23 (3) | 0.45 (4)** | 0.66 (4)** | 0.04 (1) |

Note: ***, ** and * represent statistical significance levels at 1 %, 5 % and 10 % respectively. The optimal bandwidth for the KPSS test is determined by Schwert's (1989) formula, $l_4 = int\{4(T/100)^{1/4}\}$. The critical values for the ADF test are obtained from MacKinnon (1996) while the asymptotic critical values for the KPSS test are obtained from Kwiatkowski et al. (1992).

Table 3

**Bounds test result**

| **Countries** | **Bangladesh** | **China** | **India** | **Myanmar** |
|---|---|---|---|---|
| *F*-Statistics | 9.84*** | 33.38*** | 19.44*** | 8.10*** |
| *k* | 4 | 4 | 4 | 4 |

Note: *** represents statistically significance at 1 % level. *k* delineates the number of regressors used in the model. The optimal lags are selected based on AIC.

## Results of the Stationarity Test

To avoid the fictitious regression difficulty, it is vital to determine the stationarity of the variables (Granger, 1974). For this, we use both the Augmented Dickey—Fuller (ADF) and the Kwiatkowski—Phillips—Schmidt—Shin (KPSS) stationarity tests to check the integration order of each time-series data.

Amano and Van Norden (1992) and Schlitzer (1995) point out that the combined use of ADF and KPSS tests diminishes the likelihood of erroneous conclusions on stationarity based on the indication of Monte Carlo analysis. From the ADF and KPSS tests in Table 2, the variables are mixed order of integration, i. e. I(0) and I(1). As the variable contains the mixed order of integration, we proceed with the ARDL bounds testing procedure to check whether there is a long-run association among the variables under analysis.

## Bounds Test Result

Table 3 illustrates the *F*-statistics for the analysis of co-integration based on the selected ARDL models for all BCIM countries. The calculated

Table 4

**Long run estimates (Dependent variable is lnGDP)**

| Countries | Variables | | | |
|---|---|---|---|---|
| | ln*EX* | ln*EXCH* | ln*LAB* | ln*PTS* |
| Bangladesh | 0.40*** (0.000) | –2.47*** (0.000) | –0.03 (0.938) | –0.71* (0.082) |
| China | 0.50** (0.018) | –0.01 (0.98) | 3.56 (0.49) | –4.45*** (0.000) |
| India | 0.18*** (0.000) | –0.49*** (0.000) | –1.82*** (0.000) | –0.12 (0.235) |
| Myanmar | 0.04 (0.85) | –0.99*** (0.002) | –3.04*** (0.000) | 3.11*** (0.000) |

Note: ***, ** delineate level of significance at 1 % and 5 % respectively. The value in () represents *p*-value.

*F*-statistics for all the models stay above the upper bound. Thus, we reject the null hypothesis of no co-integration. We also conclude that the requirement for co-integration for all BCIM countries is confirmed in our model.

## Findings of Long-run Elasticity

This study delves into the long-run association between exports and economic growth in BCIM countries. The long-run effect (elasticity values) of all the independent variables on the dependent variable are depicted in Table 4. All three countries except Myanmar held a statistically significant and positive association between exports and economic growth over the respective analysis period according to the ARDL-based co-integration results. This result indicates that China and Bangladesh are the most export-dependent countries among these four BCIM countries. Specifically, a 1 % increase in exports enhances 50 % and 40 % GDP in these two countries, respectively, in the long run. On the other hand, a 1 % rise in exports stimulates the GDP by 18 % in India, while Myanmar gets a statistically insignificant coefficient in the long-run estimation. Finally, this result establishes that the export-led growth hypothesis is stable for three BCIM countries, i. e. Bangladesh, China, and India, not Myanmar.

The prevalence of the export-led growth (ELG) hypothesis in the context of the BCIM forum is evident due to their trade liberalisation policies, which promote their trade, predominantly exports growth for economic development. Besides, these countries have utilised their non-export and export sectors by supplying necessary inputs for production, allocating resources, transforming institutional activities and providing technological support. The optimal use of export-oriented raw materials has helped check non-priced production externalities and non-mobility of inputs between non-export and export sectors. This policy scheme has also increased these economies' total factor productivity (TFP). Reallocating resources in non-export and export sectors has become a key instrument in augmenting their economic growth and TFP. More importantly, if the export sector increases in proportion to an economy's comparative advantage, any resource distribution from the non-export industry to the export sector may boost the TFP level, which raises economic growth (Begum, Shamsuddin, 1998). The export sector with distributive efficiency has become a catalytic element in spurring economic growth for BCIM countries. Besides, these economies have actively set up imports substituting industries from the 1960s. However, the deregulation strategy of these economies has enlarged their export-oriented activities and industrialisation to raise economic growth. The current study's finding relating to the proof of ELG hypothesis aligns with the studies by Awokuse (2003) on Canada, Al Mamun and Nath (2005) on Bangladesh, Abual-Foul (2004) on Jordan, Siliverstovs and Herzer (2006) on Chile, Gokmenoglu, Sehnaz and Taspinar (2015) on Costa Rica and Shafiullah, Selvanathan and Naranpanawa, (2017) on Australia. The study finding is incoherent with Hausmann and Klinger (2008) on Colombia and Siliverstovs and Herzer (2006) on 45 developing countries. Their case is similar to Myanmar, i. e. non-existence of ELG theorem, as found in this study.

As explored in the long-run estimation, the negative coefficient of the exchange rate is supportive for export promotion and thus economic growth for BCIM economies. Specifically, depreciation in currency promotes the exports of source countries as importers are encouraged to import due to currency depreciation (Dey, Tareque, 2021). The ARDL estimation shows the negatively statistical significance of exchange rates on economic growth, which is relevant to all export-dependent countries in the long run (Table 4). Therefore, this theoretical intuition is also applicable in BCIM countries that expand their export growth and hence economic growth. This study finding is in line with Eichengreen (2007), Rodrik (2008), Obansa et al. (2013) and Razzaque, Bidisha and Khondker (2017). On the other hand, Rapetti, Skott and Razmi (2012) oppose this finding, stating that the real exchange rate does not matter for economic growth in developing countries.

Table 5

**Short-run estimates (Dependent variable is ln*GDP*)**

| Variables | Countries | | | |
|---|---|---|---|---|
| | Bangladesh | China | India | Myanmar |
| Δln*GDP* | | | | |
| Δln*EX* | 0.10** (0.011) | 0.19*** (0.000) | | |
| Δln*EXCH* | –0.97*** (0.000) | | | 0.34** (0.015) |
| Δln*LAB* | | –6.20*** (0.003) | | –6.34* (0.051) |
| Δln*PTS* | 0.37*** (0.000) | –0.15*** (0.000) | | 0.10 (0.457) |
| $ECM_{t-1}$ | –0.85*** (0.000) | –0.17*** (0.000) | –1.35*** (0.000) | –0.85*** (0.000) |
| *R*-squared | 0.96 | 0.95 | 0.83 | 0.89 |
| Adjusted *R*-squared | 0.93 | 0.92 | 0.82 | 0.81 |

Note: ***, ** and * delineate level of significance at 1 %, 5 % and 10 % respectively. The value in () is *p*-value.

Table 6

**Diagnostic test**

| Countries | *RESET Test* | *LM Test* | *JB Test* | *ARCH Test* |
|---|---|---|---|---|
| Bangladesh | 0.15 (0.223) | 2.44 (0.17) | 1.96 (0.37) | 1.57 (0.22) |
| China | 0.19 (0.341) | 1.00 (0.39) | 1.96 (0.37) | 1.91 (0.17) |
| India | 0.13 (0.201) | 2.21 (0.10) | 1.43 (0.48) | 0.12 (0.72) |
| Myanmar | 0.20 (0.973) | 1.78 (0.22) | 0.15 (0.92) | 1.73 (0.19) |

Notes: The values in () is F-Statistics; the value in () is p-values; RESET denotes Ramsey model specification test to check model stability; *LM* test is to check serial correlation; *JB* means Jarque-Bera used for normality test; and *ARCH* is Heteroskedasticity test.

Mainly, an abundance of labour, skill labour, lower-cost labour, and labour efficiency can enormously promote exports and economic growth for any economy. The cheap labour cost and labour abundance have become key to expediting income growth in BCIM countries. Labour as a crucial indicator of economic growth has a significantly long-run negative effect in India and Myanmar, as supported by the studies of De Gregorio (1992) and Amir Khan and Bilal (2015) and statistically positive and insignificant in case of Bangladesh and China, as espoused by the investigations of Butt and Hassan (2008), Haque et al. (2019), Kala, Masbar and Syahnur (2018) and Wijaya et al. (2021).

The primary concern relating to the economic growth of BCIM countries is the political uncertainty issue, i. e. political terror scale (PTS) that adversely affects Bangladesh and China's economic growth. This finding is in line with Asteriou and Price (2001), Fosu (2001) and Islam and Islam (2021). On the other hand, in the case of India, political uncertainty is insignificant; and it affects GDP positively in the context of Myanmar. It is an exciting finding that the political uncertainty issue does not influence economic growth in India and Myanmar in the long run. This finding is coherent with Dutta Sobel and Roy(2013), Adams (2009) and Liu et al. (2021).

## Short-run Estimates

Table 5 depicts the short-run implications. While exports are found to have a positively significant lagged effect on GDP in the case of Bangladesh and China, there is no such experience in India and Myanmar.

Real exchange rates are negatively significant in Bangladesh, and in the case of Myanmar, they are positively significant in the short run (Table 5). There is no evidence of real exchange rates in China and India. Labour's contribution to GDP in China and Myanmar is negative in the short run, but there is no influence of labour in Bangladesh and India. Political uncertainty is positively significant in Bangladesh, and it is

Table 7

**Modified Wald (MWALD) causality**

| Countries | Null hypothesis: Exports do not Granger-cause GDP | |
|---|---|---|
| | Lag (*k*) | MWALD statistics |
| Bangladesh | 5 | 9.60*** (0.001) |
| China | 3 | 3.43* (0.063) |
| India | 3 | 3.03* (0.0813) |
| Myanmar | 3 | 0.98 (0.32) |
| | Null hypothesis: GDP does not Granger-cause exports | |
| | Lag (*k*) | MWALD statistics |
| Bangladesh | 11 | 4.77** (0.028) |
| China | 9 | 0.07 (0.777) |
| India | 8 | 4.12** (0.042) |
| Myanmar | 8 | 20.64*** (0.000) |

Note: *** and ** represent statistical significance at 1 % and 5 % levels respectively. The order of the optimal lag (*k*) is determined by AIC.

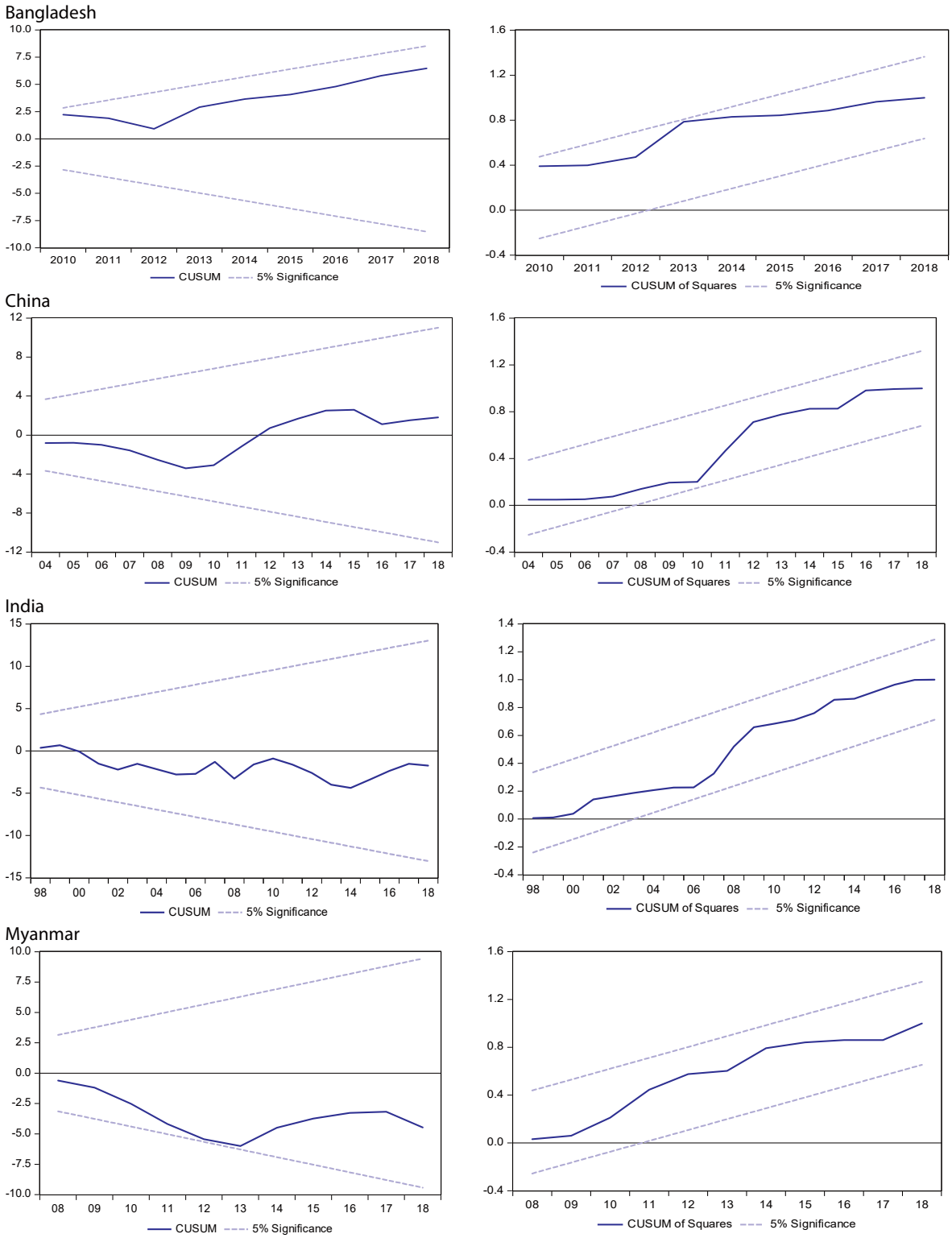


**Fig. 2.** *CUSUM and CUSUM of square tests for BCIM countries*

also negatively substantial in China and insignificant in Myanmar. More importantly, error correction mechanisms are negative and statistically significant at a 1 % level in all BCIM countries. In the case of India, the ECM value is higher (1.36), implying the quicker speed of adjustment from any short-run disequilibrium to long-run equilibrium. Bangladesh and Myanmar hold ECM values at 85, meaning a higher rate of readjustment. However, India shows a lower ECM value at 17, which will take more time to correct any short-run disequilibrium to reach long-run equilibrium.

### Diagnostic tests

Table 6 represents the diagnostic statistics of ARDL models for all four BCIM countries. The Ramsey RESET test results show that the models are free from any misspecification problem. Lagrange multiplier (LM) tests reveal no serial correlation at a 5 % level of significance. JB test results depict that all residuals in the models are distributed normally. Further, the autoregressive conditional heteroskedasticity (ARCH) test confirms no heteroskedasticity issue in the models.

### Stability of the Model

The structural stability test of the parameter on the axis cumulative sum of recursive residuals (CUSUM) and cumulative sum of recursive residuals squares (CUSUMSQ) procedures coined by Pesaran and Pesaran (1997) are employed to determine the models' robustness.

The CUSUM and CUSUMSQ tests in graphical representation are depicted in Fig. 2. As per precondition, if the plots stay within the 5 % level of critical bound, it indicates that the parameters of the models are stable and consistent. Furthermore, the plots constructed in the models reveal that the CUSUM and CUSUMSQ parameters exist within the boundaries for all BCIM countries over the period.

### MWALD Causality Test Result

Granger theorem depicts that there will be at least a unidirectional causal relationship among the variables if they are co-integrated. We then advance to measure the augmented VAR system to check the causality between exports and GDP for BCIM countries.

Table 7 shows a causal association between exports and GDP in BCIM countries utilising the Toda-Yamamoto technique. The MWALD test statistics reveal that the null hypothesis at a 1 % level of significance for Bangladesh and at a 10 % level for both China and India is rejected respectively, implying that exports Granger-cause GDP for these three countries in BCIM forum. Besides, Table 7 also represents the testing result of the null hypothesis that GDP does not Granger-cause exports. Here, the null hypothesis of no co-integration for both Bangladesh and India is rejected at 5 % and for Myanmar at a 1 % level of significance.

It shows that bidirectional causality between exports and GDP is found in both Bangladesh and India; and unidirectional causal relationship from exports to GDP is explored in the context of China. Finally, there is a unidirectional causality running from GDP to exports in Myanmar's case. According to MWALD Granger causality results, we conclude that both export-led growth (ELG) and growth-led (GLE) hypotheses are stable in Bangladesh and India; only ELG is valid for China, and GLE is relevant for Myanmar (Fig. 3).

### Conclusion and Policy Recommendations

The key objective of this study is to explore the export-led growth (ELG) hypothesis in the context of BCIM economies during 1980–2018. To this end, the present study utilises the ARDL co-integration technique and the MWALD Granger causality tests for analysing the time-series data. The ARDL-based co-integration test shows that the economic growth, exports, labour, and political uncertainty are co-integrated in BCIM countries. It also indicates that exports and GDP in these economies move together within the purview of three control variables: exchange rate, labour, and political uncertainty. Besides, the MWALD Granger causality tests show that bidirectional causality exists between exports and GDP in the context of both Bangladesh and India. Therefore, both the ELG and GLE hypotheses are stable in these two countries. Besides, a unidirectional causal relationship between exports to GDP is explored in the case of China, implying the validity of the ELG hypothesis in this country. In the case of Myanmar, unidirectional causality running from GDP to exports is discovered, indicating that the GLE hypothesis is relevant to this economy over the analysis period.

Given the results obtained from our estimation, we can conclude that all four BCIM economies should concentrate on utilising their unused resources to promote exports and economic growth. This forum (BCIM countries) aimed to achieve its vision of new resource mobilisation from its inception in 1999. Besides, this forum also intended to heighten their existing growth strategies by promoting their exports as per their settled strategy. The investigated results indicate that BCIM countries, especially Bangladesh, China, and India, achieved spectacular economic growth through export promotion, which does not apply to Myanmar. In this case, Myanmar should utilise its unused resources and the labour productivity potential in the manufacturing production sector. Besides, this economy should ensure a volatility-free political environment making the production process vibrant and compelling. Even a stable political situation can encourage foreign investors to deploy their funds in the manufacturing industries of Myanmar to stimulate exports and income growth. Overall, this economy should make its export-oriented policies convenient to the importers of developed countries, which is also applicable to the other three countries of the BCIM Forum. Furthermore, new policy strategies must diversify

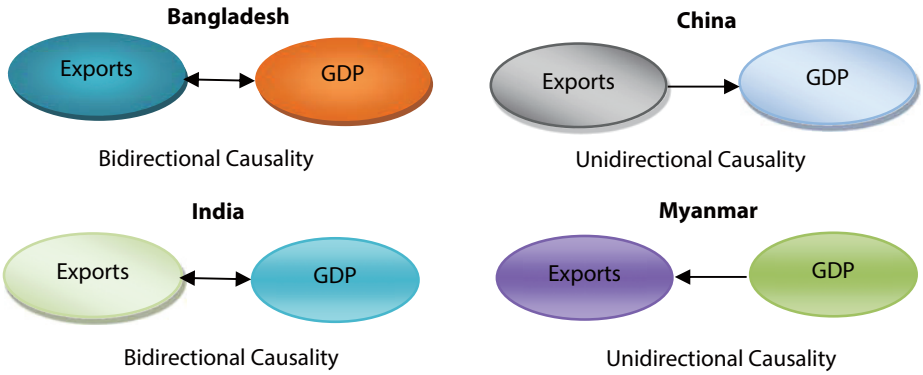


**Fig. 3.** *Direction of causality*

the export items and markets by intensifying regional integration among these countries.

BCIM countries aimed to add some other countries to their integration process to support more export promotion for faster economic growth. This would help materialise this forum's dream to be a dynamic economic force in the international market. However, more importantly, decision-makers of the BCIM countries should develop inner stimulants of exports by enhancing labour productivity and easing political uncertainty. Even other external channels of growth, such as foreign direct investment (FDI), prudent diplomatic relations with importer countries, potent G2G negotiation, etc., are dire needs for this economic forum to increase their export promotion and income growth. Furthermore, increasing public investment is core to stimulating private investment by building infrastructures, building capacity for human resources and raising productive public capital. Moreover, these countries' public investment should encourage and facilitate the private investors by crowding-in effect. The prevalence of the crowding-out effect can reduce export volume and increase import size, resulting in a trade deficit for these countries. Hence, these economies should adopt a pragmatic investment policy for external and internal investors. A viable investment climate can help proliferate export-based industries and diversify export goods. Above all, policymakers of these countries should design proper macroeconomic policies within the framework of the quality institution that will be a key to promoting export growth and accelerating economic growth.

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## About the authors

**Md. Monirul Islam** — PhD Fellow, Graduate School of Economics and Management, Ural Federal University; Assistant Professor, Bangladesh Institute of Governance and Management (BIGM), University of Dhaka (Affiliated); https://orcid.org/0000-0002-9818-1676 (Ekaterinburg, Russian Federation; Dhaka, Bangladesh; e-mail: mdmonirul.islam@urfu.ru, monirul.islam@bigm.edu.bd).

**Mohammad Tareque** — PhD, Director, Bangladesh Institute of Governance and Management (BIGM), University of Dhaka (Affiliated); https://orcid.org/0000-0001-5165-5224 (Dhaka, Bangladesh; e-mail: director@bigm.edu.bd).

**Md. Moniruzzaman** — PhD, Associate Professor of Economics, Bangladesh Institute of Governance and Management, University of Dhaka (Affiliated); https://orcid.org/0000-0001-6236-3876 (Dhaka, Bangladesh; e-mail: monir65@gmail.com).

**Md. Idris Ali** — PhD Researcher, Environmental Applied Science and Management, Ryerson University; https://orcid.org/0000-0002-9122-8005 (Toronto, Canada; e-mail: mdidris.ali@ryerson.ca).

## Информация об авторах

**Ислам Мд. Монирул** — аспирант, Институт экономики и управления, Уральский федеральный университет; доцент, Бангладешский институт управления и менеджмента, Даккский университет; https://orcid.org/0000-0002-9818-1676 (Российская Федерация, г. Екатеринбург; Бангладеш, г. Дакка; e-mail: mdmonirul.islam@urfu.ru, monirul.islam@bigm.edu.bd).

**Тареке Мохаммад** — PhD, директор, Бангладешский институт управления и менеджмента, Даккский университет; https://orcid.org/0000-0001-5165-5224 (Бангладеш, г. Дакка; e-mail: Director@bigm.edu.bd).

**Монируззаман Мд.** — PhD, доцент экономики, Бангладешский институт управления и менеджмента, Даккский университет; https://orcid.org/0000-0001-6236-3876 (Бангладеш, г. Дакка; e-mail: monir65@gmail.com).

**Али Мд. Идрис** — аспирант, прикладная экология и менеджмент, Университет Райерсона; https://orcid.org/0000-0002-9122-8005 (Канада, г. Торонто; e-mail: mdidris.ali@ryerson.ca).

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