Eurasian Journal of Business and Economics, 15(29), 35-49, (2022).

# Trade Openness, Capital Formation, and Economic Growth: Empirical Evidence from India

**Suadat Hussain WANI**[*]

**Received:** November 17, 2021 **Revised:** April 9, 2022 **Accepted:** April 30, 2022


## *Abstract*

*The main objective of the present study is to examine the link between trade openness, capital formation, and economic growth in the case of India by applying an autoregressive distributed lag (ARDL) bound testing approach. To achieve this objective, the trade openness index is developed using various proxies of trade openness. The empirical results indicate negative relation between trade openness and economic growth in case of India, both in the short-run and long-run. The results of the present study have important policy implications for India. Among others, the study suggests that those policies need to be adopted, which can boost human and physical capital formation so that economy can grow to the threshold level required to reap the benefits of trade openness.*


***Keywords:*** *Trade openness, human capital, physical capital, ARDL, economic growth*

***JEL Classification Codes:*** *F43, O4*
***UDC:*** *339.3*
***DOI:*** https://doi.org/10.17015/ejbe.2022.029.03

[*] Ph.D., Research scholar. Centre of Central Asian Studies, University of Kashmir, Hazartbal Srinagar, India. E-mail: Suadat.scholar@kashmiruniversity.net

## 1. Introduction

Economists, right from Adam Smith to Paul Krugman, have highlighted the importance of international trade in the economic growth of a country. Thus, the relationship between openness to the outside world and growth is widely debated as there is optimism among policymakers in favour of trade openness (Yanikkaya, 2003, Sarkar, 2005 and 2008). This is due to the failure of the import substitution industrialisation (ISI) strategy adopted by many countries after World War II. The ISI strategy was based on the belief that rich countries are going to exploit developing countries in international trade and financial markets. However, empirical evidence from developing countries suggests that this strategy has led only to the growth of inefficient firms, misallocation of resources, and the emergence of few powerful lobbies and interest groups in these countries (Chatterji et al., 2014).

On the other hand, the adoption of export-oriented industrialisation by many countries like Hong Kong, South Korea, China, and Singapore in the 1970s has led to their accelerated economic growth, which has motivated many countries to abandon the ISI strategy and adopt export-led growth policy. In the 1990s, World Bank and IMF recommended ten major development policy initiatives known as the Washington consensus, in which they recognised trade openness as a crucial element to achieve a high rate of economic growth (Sengupta, 2020). Besides, various World Development Reports (World Bank, 1987, 1991, 1998) argue that outward-oriented countries have performed better on the economic front in comparison to inward-oriented countries. Lastly, the development of endogenous growth theories provided a theoretical base for examining the association between economic growth and trade openness. These theories indicate that by enhancing the scale of the spillover effect, trade openness increases growth (Romer, 1990).

This study is motivated because India opened its economy to foreign trade in the 1990s to obtain and sustain high economic growth. The history of economic growth in case of India can be broadly divided into two policy regimes (Aggarwal & Kumar, 2012). During 1950-80, the state-led growth model was adopted to focus on growth with social justice, and the public sector played a crucial role in the economic development of the country during this period. However, from 1980 onwards, the country started the process of moving towards an open and liberal regime. This process towards market-led growth was accelerated from the mid-'80s, followed by more profound and systemic liberalisation measures from 1991 onwards (Chatterji et al., 2014). The reforms were started with the devaluation of the currency, liberalisation of the exchange rate in March 1992, restrictions on large industrial houses relaxed under the MRTP Act, industrial licensing abolished with some exceptions, and entry requirements for FDI eased (Sengupta, 2020). In addition, a five-year export-import policy (1992-97) was launched in 1992 under which "export was required to capitulate 40 percent of foreign exchange received at the official market exchange rate" (Hye & Lau, 2015). The government was supposed to import necessary commodities, including petroleum, fertilizers, and life-saving drugs with

this amount, and the remaining 60 percent to be used to import raw materials; the import licensing system was replaced with tariffs, and duty on capital goods was reduced from 25 percent to 15 percent (Sengupta, 2020). In addition, to promote trade with SAARC, all quantitative restrictions on imports (2300 commodities) from these countries were removed on August 1, 1998 (Hye & Lau, 2015). Besides, various export promotion schemes like software technological parks, special export zones, special import licenses, etc., were introduced.

However, the theoretical literature points toward a group of models which argue that trade openness can enhance or impede international economic growth (Rivera-Batiz & Romer, 1990). If countries have different factors in endowment, then although economic integration increases global economic growth, there is the possibility of negative influence on individual countries, as suggested by Young (1991) and Kind (2002). In addition, there are many empirical studies, including Batra (1992), Leamer (1995) Vamvakids (2002), and Kim (2011), that provide evidence of the negative relationship between trade openness and economic growth.

With this background, it is important to explore the link between trade openness and economic growth in case of India. Given the available literature, the present study aims to examine the effects of trade openness on economic growth in India from 1992 to 2019. In contrast to available literature, Following Hye and Lau (2015), the present study constructs a composite trade openness index which is missing in the available literature, by using various proxies of trade openness like the export of goods and services as a percentage of GDP, import of goods and services as a percentage of GDP and total trade as percent of GDP. The study employs a new endogenous theory by including a trade openness index and using a relatively new cointegration technique like Autoregressive Distributed Lag (ARDL) procedure (Pesaran et al., 2001). The rest of the paper is organized as; Section 2 discusses a review of the literature, followed by methodology in section 3. Empirical results are discussed in Section 4. The paper ends with the conclusion and policy implications discussed in section 5.

## 2. Literature Review

The link between trade openness and economic growth has been discussed by many researchers over the years; however, there is no clear consensus regarding the impact of trade openness on economic growth. According to Barua and Chakraborty (2006), in the case of India, trade liberalisation has reduced industrial concentration and producer surplus and has enhanced consumer surplus in the country. Similarly, Topalova and Khandelwal (2011) argue that it is through trade liberalisation that the productivity of firms improves, which enhances the welfare of the masses. Marelli and Signorelli (2011) have used different approaches to examine the relationship between economic growth and trade openness in the case of India and China. The study concludes that there is a positive relationship between trade openness and economic growth in these countries. Using panel data for 1989-2010, Mercan et al.

(2013) have examined the effect of trade openness on economic growth in the case of Brazil, China, India, Russia, and Turkey. To achieve the objective of the study, the ratio of exports plus imports to GDP was used. The study concludes that trade openness positively impacts economic growth in the selected countries. Thus, these countries should formulate policies to enhance foreign trade especially exports which can help to achieve the objective of sustainable growth. Chatterji et al. (2014) have examined the relationship between trade openness and economic growth in the case of India, covering the period 1970-2010 using the vector autoregressive estimation technique. The study concludes that trade volume had positively contributed to the economic growth of the country from 1980 onwards when policy reforms towards market-oriented regimes were initiated. In another study, Hye and Lau (2015) are of the view that physical and human capital are particularly related to economic growth. In contrast, trade openness negatively impacts growth performance in long run in the case of India. However, Sengupta (2020) has concluded that trade openness has a negative impact on India's economic growth both in the short-run and long-run.

Kind (2002) argues that due to the difference in the size of home markets, there are ambiguous effects of trade openness on the economic performance of countries. Whereas Yanikkaya (2003) is of the view that trade enhances growth for both developing and developed countries through a number of channels like comparative advantage, scale economies, and transfer of technology. However, the study concludes that trade restrictions can promote growth, especially in developing countries under certain conditions. Besides, Ved and Sudesh (2007) have found bidirectional causality between economic growth and trade openness and concluded that higher trade openness enhances economic growth. According to Klasra (2011), economic growth derives from exports in the case of turkey, whereas trade openness derives from economic growth in the case of Pakistan. Whereas Hye (2012) has examined the long-run effect of trade openness on the economic growth of Pakistan from 1971 to 2009 using JJ cointegration, dynamic OLS, autoregressive distributed lag (ARDL), and variance decomposition. The study concludes that physical and human capital positively contributes to the economic growth of Pakistan. However, in contrast to other studies related to the country, the author concludes negative relation between trade openness and economic growth. Singh (2011) has used the neoclassical growth framework to examine the effects of trade on economic growth in the case of Australia. The findings show that exports had positive and significant growth effects while the growth effects of imports were found to be predominantly negative. Similarly, Adhikary (2011) finds that trade openness had a negative but diminishing influence on economic growth. Using the ratio of export and imports over GDP as a proxy for the degree of trade openness in Bangladesh for the period 1986–2008, the study revealed that there is a significant negative relationship between trade openness and economic growth.

Malefane and Odhiambo (2021) have examined the impact of trade openness on economic growth in the case of Lesotho using the ARDL bounds testing approach.

The study concludes that trade openness has no significant impact on economic growth both in the short-run as well as in the long-run. The findings suggest that those policies should be adopted which can enhance human capital and infrastructure so that the benefits of trade openness can be reaped in the long run. Su et al. (2019) have investigated the role of trade openness and economic institutions in the growth process of Vietnam by employing GMM estimators. The findings show that trade openness and foreign direct investment have a positive impact on the economic performance of the country. Moreover, economic institutions significantly influence the combined effect of trade openness and FDI in improving the economic performance of the country. In addition, Kong et al. (2021) has examined the relationship between economic growth and trade openness under exchange rate fluctuation in China from 1994-to 2018 using ARDL and the threshold model. The study concludes that trade openness has improved the quality of economic growth in the country both in the short-run and long-run. Though the short-run fluctuation deviates from long-run equilibrium, it is through automatic adjustment that the quality of economic growth can remain stable. Using the ARDL model, Tahir and Hayat (2020) argue that in addition to trade openness, natural resources and domestic investment play a positive and significant role in the economic development of Brunei Darussalam. Thus, to push further the process of economic development, policymakers should push for increased trade liberalization in the country.

Given the available literature, it can be concluded that there is no general agreement on whether trade openness impacts economic growth positively or negatively. The present study tries to fill the gap in the existing literature by examining the relationship between trade openness and economic growth in the case of India. There is sound literature that supports the trade-growth relationship (Keho, 2017; Intisar et al., 2020). Though the main objective is to study the trade-growth relationship, other factors, which include physical capital and human capital, are also important from a growth perspective. For example, Bal et al. (2016) show a positive relationship between growth and domestic investment and stress on the need to increase investment to maintain higher growth. Similarly, Kartal, et al. (2017) indicate that human capital is positively related to economic growth. Although there are many studies in the available literature on the subject, the novelty of the present study is the introduction of the trade openness index, long time period, and introduction of other variables which play an important role in the economic growth of a country.

## 3. Methodology

### 3.1. Data collection and transformation

The study utilizes annual time series data from 1993-2019. Following the available literature discussed above, real Gross Domestic Product (GDP) is used as a proxy for economic growth, whereas secondary school enrollment (% gross) is used for Human

Capital (HC) and real gross fixed capital formation for Physical Capital (PC). The Trade Openness Index (TOI) is constructed by using exports, imports and total trade as a percentage of GDP for this study. The data for these variables were collected from World Development Indicators, World Bank.

$$LnGDP_t = \propto_0 + \propto_1 LnHC_t + \propto_2 LnPC_t + \propto_3 LnTOP1_t + U_t \quad (1)$$

Where $LnGDP_t$ represent the real gross domestic product, $LnHC_t$ denoted human capital. $LnPC_t$ is used for physical capital and $LnTOP1_t$ represents trade openness. $U_t$ represents ordinary disturbance term.

## 3.2. Trade Openness Index

The available literature indicates that various proxies for trade openness like exports as a percentage of GDP, imports as a percentage of GDP, and total trade as a percentage of GDP have been utilized by researchers to examine the impact of trade openness on the economic growth of different countries. The benefit of using these indicators is that data for these variables are easily available and a lower value indicates a higher degree of policy intervention in international trade. Each of these measures captures a different aspect of trade openness. Grossman and Helpman (1989) are of the view that trade openness affects the economic growth of a country by reallocation of resources. Thus, according to this argument, trade openness leads to the production process in a country according to its comparative advantage. Similarly, exports as a percentage of GDP are used as a proxy for openness to capture the length of trade openness related to scale economies. Besides, to measure the level of international competition in the domestic market, imports as a percentage of GDP are used as a proxy for trade openness. Further, the share of total trade as a percent of GDP provides a representation of technological spillover due to trade liberalization measures by a particular country (Hye & Lau, 2015). In the present study, the trade openness index is calculated by using principal component analysis (PCA), which has been discussed in the estimation section.

## 3.3. Estimation framework

In time series analysis, the first step is to examine descriptive statistics and check the unit root problem of the data set. Akcay and Demirhan (2005) are of the view that non-stationary variables can be handled through cointegration techniques, whereas stationary variables can be modelled in levels through granger causality.

Researchers have, over the years, developed different cointegration models for non-stationary variables. Among these techniques, “Autoregressive Distributed Lagged Model (ARDL)” developed by Pesaran et al. (2001) works well. The idea behind using this technique is to explore the stable long-run stationary relationship between non-stationary variables. The ARDL has been widely used in recent years due to its multiple benefits; hence it is adopted in the present study. This method has the following advantages: first, it can apply irrespective of whether the regressors are integrated of order one or order zero or mutually (Pesaran et al. 2001). The second

ARDL model is free from serial correlation and endogeneity problems. Finally, a dynamic error correction model (ECM) can be derived from ARDL through a simple linear transformation.

### 3.4. ARDL modelling

Following Hye and Lau (2015), Tahir and Hayat (2020) equation (1) is converted into the ARDL framework:

$$LnGDP_t = \propto_0 + \sum_{i=1} n1 \propto_{1i} LnGDP_{t-i} + \sum_{i=0} n2 \propto_{2i} LnPC_{t-i} + \sum_{i=0} n3 \propto_{3i} LnHC_{t-i} + \sum_{i=0} n4 \propto_{4i} LnTOP1_{t-i} + \beta_1 LnGDP_{t-1} + \beta_2 LnPC_{t-1} + \beta_3 LnHC_{t-1} + \beta_4 LnTOP1_{t-1} + \epsilon_t \quad (2)$$

$$LnPC_t = \propto_0 + \sum_{i=1} n1 \propto_{1i} LnPC_{t-i} + \sum_{i=0} n2 \propto_{2i} LnGDP_{t-i} + \sum_{i=0} n3 \propto_{3i} LnHC_{t-i} + \sum_{i=0} n4 \propto_{4i} LnTOP1_{t-i} + \beta_1 LnGDP_{t-1} + \beta_2 LnPC_{t-1} + \beta_3 LnHC_{t-1} + \beta_4 LnTOP1_{t-1} + \epsilon_t \quad (3)$$

$$LnHC_t = \propto_0 + \sum_{i=1} n1 \propto_{1i} LnHC_{t-i} + \sum_{i=0} n2 \propto_{2i} LnGDP_{t-i} + \sum_{i=0} n3 \propto_{3i} LnPC_{t-i} + \sum_{i=0} n4 \propto_{4i} LnTOP1_{t-i} + \beta_1 LnGDP_{t-1} + \beta_2 LnPC_{t-1} + \beta_3 LnHC_{t-1} + \beta_4 LnTOP1_{t-1} + \epsilon_t \quad (4)$$

$$LnTOP1_t = \propto_0 + \sum_{i=1} n1 \propto_{1i} LnTOP1_{t-i} + \sum_{i=0} n2 \propto_{2i} LnGDP_{t-i} + \sum_{i=0} n3 \propto_{3i} LnPC_{t-i} + \sum_{i=0} n4 \propto_{4i} LnHC_{t-i} + \beta_1 LnGDP_{t-1} + \beta_2 LnPC_{t-1} + \beta_3 LnHC_{t-1} + \beta_4 LnTOP1_{t-1} + \epsilon_t \quad (5)$$

Equation (2-5) are the ARDL representations of equation (1) which includes the variables discussed above. The parameters ($\propto_0 - \propto_4$) measure short-run relationship and ($\beta_1 - \beta_4$) capture long-run relationships among variables. Equations (2-5) would be estimated through the ARDL framework.

## 4. Estimation Results

### 4.1. Principal Component Analysis

By definition, different proxies of trade openness are positively correlated to each other and thus cannot be used in a single model. However, the use of any one proxy would lead to the loss of information. Following Hye (2012) and Hye and Lau (2015), the composite trade openness index (TOI) has been used in the present study. The index is calculated by using principal component analysis (PCA). The eigen values indicate that the first component shows about 99.7 percent cumulative proportion of variation, whereas the second component shows 0.27 percent standard variation, as presented in Table 1. Thus, given the higher level of variability shown by the first principal component, the study uses the first eigenvector values as a weight to construct the trade openness index denoted as TOP1. A look at Table 1 shows that the separate contribution of different proxies in the standardized variance of the first principal component is 57.6, 57.7, and 57.8 percent, respectively.

**Table 1. Principal component analysis**

| Eigenvalues: (Sum = 3, Average = 1) | | | | | |
|---|---|---|---|---|---|
| Number | Value | Difference | Proportion | Cumulative Value | Cumulative Proportion |
| 1 | 2.991 | 2.983 | 0.997 | 2.991 | 0.997 |
| 2 | 0.008 | 0.008 | 0.002 | 2.999 | 1.000 |
| 3 | 1.92 | --- | 0.000 | 3.000 | 1.000 |
| Eigenvectors (loadings): | | | | | |
| Variable | PC 1 | PC 2 | PC 3 | | |
| LNEXP01 | 0.5768 | 0.735 | 0.355 | | |
| LNIMP01 | 0.577 | -0.674 | 0.461 | | |
| LNTOP | 0.578 | -0.061 | -0.813 | | |
| Ordinary correlations: | | | | | |
| | LNEXP01 | LNIMP01 | LNTOP | | |
| LNEXP01 | 1.000 | | | | |
| LNIMP01 | 0.991 | 1.000 | | | |
| LNTOP | 0.997 | 0.998 | 1.000 | | |

Source: Author's calculation

Figure 1 shows the graph of different trade indicators which have been used to construct the trade openness index in the present study. The graph shows a moderate increase in trade openness from 1992 to 2000 when it declined a little bit. From 2002, it shows an increasing trend till 2009 when it declined rapidly owing to the financial crisis. Finally, trade openness recorded some fluctuations in recent years due to declining demand in the world market for mechanized goods and the trade war between the USA and China.

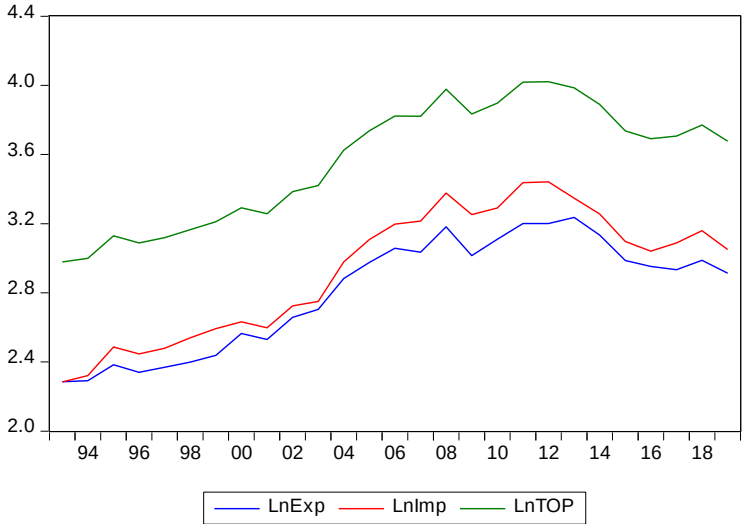


**Figure 1. Trade Openness Indictors**

## 4.2. Descriptive Statistics

Before discussing the empirical findings, descriptive statistics have been presented in Table 2 which include mean, median, maximum value, minimum value, and standard deviation. Mean and standard deviation are presented for determining range and getting an overview of the data.

**Table 2. Descriptive Statistics**

| | TOP1 | LNGDP | LNPC | LNHC |
|---|---|---|---|---|
| Mean | -9.701 | 27.881 | 3.463 | 4.031 |
| Median | 0.652 | 27.885 | 3.428 | 4.005 |
| Maximum | 2.304 | 28.709 | 3.736 | 4.318 |
| Minimum | -2.979 | 27.063 | 3.194 | 3.762 |
| Std. Dev. | 1.762 | 0.506 | 0.164 | 0.205 |
| Observations | 27 | 27 | 27 | 27 |

Source: Author's calculation

## 4.3. Unit root test

In the present study, Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) have been utilised to check the stationery nature of the variables. Both the tests assume the unit root problem under the null hypothesis. The result for these tests is presented in Table 3. Both these tests have confirmed the unit root problem associated with GDP, human capital, physical capital, and trade openness. However, all variables are stationary at first difference. Thus, given the nature of the variables, following Tahir and Hayat (2020), the ARDL approach has been adopted in the present study.

**Table 3. Unit root results**

| | ADF test | | PP test | |
|---|---|---|---|---|
| Variables | Level | First difference | Level | First difference |
| LnGDP | 0.11 | -4.32*** | 0.17 | -4.27*** |
| LnHC | 0.09 | -4.33*** | -0.01 | -4.38*** |
| LnPC | -1.74 | -4.91*** | -1.79 | -4.93*** |
| LnTOP1 | -1.79 | -4.3*** | -1.74 | -4.37*** |

Note: *, **, *** represent 10 %, 5% and 1% level of significance.
Source: Author's calculation

## 4.4. Bound testing results

The error correction model has been estimated in the ARDL framework, as shown in Table 4. All variables (Trade openness index, GDP, Physical capital, and Human capital) used in the study have been treated as dependent variables step by step to check cointegration among them. The null hypothesis of the absence of cointegration can be rejected for the equation where GDP, physical capital, and trade openness are treated as dependent variables, as the calculated F-value is greater

than the critical value. In the case of human capital, the presence of a cointegration relationship is rejected as F-value is lower than the critical value.

**Table 4. Bounding test**

| Dependent variables | F-test | Decision |
|---|---|---|
| D(LNGDP) D(LNPC) D(LNHC) D(LNTOP1) | 5.24 | Co-integrated |
| D(LNPC) D(LNHC) D(LNTOP1) D(LNGDP) | 12.29 | Co-integrated |
| D(LNHC) D(LNTOP1) D(LNGDP) D(LNPC) | 0.77 | Not co-integrated |
| D(LNTOP1) D(LNGDP) D(LNPC) D(LNHC) | 11.15 | Co-integrated |
| Critical values | Lower bound 1(0) | Upper bound 1(1) |
| 1 % | 3.65 | 4.66 |
| 5 % | 2.79 | 3.67 |
| 10 % | 2.37 | 3.2 |

Source: Author's calculation

After checking for cointegration, the next step is to estimate the "error correction model" mainly for two purposes. First, it helps to examine short-run dynamics. Second, to provide information about the speed of adjustment in the model. Thus, given these benefits, the following ECM models have been specified:

$$LnGDP_t = \propto_0 + \sum_{i=1} n1 \propto_{1i} LnGDP_{t-i} + \sum_{i=0} n2 \propto_{2i} LnPC_{t-i} + \sum_{i=0} n3 \propto_{3i} LnHC_{t-i} + \sum_{i=0} n4 \propto_{4i} LnTOP1_{t-i} + \partial_1 ECT_{t-1} + \epsilon_t \quad (6)$$

$$LnPC_t = \propto_0 + \sum_{i=1} n1 \propto_{1i} LnGCF_{t-i} + \sum_{i=0} n2 \propto_{2i} LnGDP_{t-i} + \sum_{i=0} n3 \propto_{3i} LnHC_{t-i} + \sum_{i=0} n4 \propto_{4i} LnTOP1_{t-i} + \partial_2 ECT_{t-1} + \epsilon_t \quad (7)$$

$$LnHC_t = \propto_0 + \sum_{i=1} n1 \propto_{1i} LnHC_{t-i} + \sum_{i=0} n2 \propto_{2i} LnGDP_{t-i} + \sum_{i=0} n3 \propto_{3i} LnPC_{t-i} + \sum_{i=0} n4 \propto_{4i} LnTOP1_{t-i} + \partial_3 ECT_{t-1} + \epsilon_t \quad (8)$$

$$LnTOP1_t = \propto_0 + \sum_{i=1} n1 \propto_{1i} LnTOP1_{t-i} + \sum_{i=0} n2 \propto_{2i} LnGDP_{t-i} + \sum_{i=0} n3 \propto_{3i} LnPC_{t-i} + \sum_{i=0} n4 \propto_{4i} LnHC_{t-i} + \partial_4 ECT_{t-1} + \epsilon_t \quad (9)$$

In equations (6-9), the term ECM denotes the error correction term which shows the speed of adjustment, whereas other variables have already been defined.

### 4.5. Results and analysis

Table 5 demonstrates the findings of the present study, which shows both short-run and long-run results, respectively. In contrast to the theoretical justification of Romer (1990) and empirical results of Wacziarg and Welch (2008), Yanikkaya (2003), Dash (2009), and Marelli and Signorelli (2011), trade openness shows a negative relationship with economic growth both in the short-run and long-run in case of India. The results indicate that a 1 percent increase in trade openness leads to a 0.02 percent decline in the economic growth of the country, given other things remain constant. The results are supported by earlier findings of Kim (2011), who found a negative relationship between trade openness and economic growth in the case of less developed countries. Moreover, Hye (2012) and Hye and Lau (2015) found a negative relationship between trade openness and economic growth in the case of

Pakistan and India, respectively. However, in terms of magnitude, the results reveal that impact of trade openness on economic growth is lowest compared to other variables. Hye and Lau (2015) show that a 1 percent increase in trade openness leads to a 0.301 percent decline in economic growth in the long run in the case of India. However, the results in the present study indicate that a 1 percent increase in trade openness leads to a 0.03 percent decline in economic growth in the long run. Comparing the results in these studies indicate that in the long run, trade openness would reap its benefits and help in the long-run development of the country.

The other variables, including physical capital and human capital, are positively related to economic growth, as suggested by the theoretical justification of these variables. Thus, domestic investment has a significant and positive impact on the economic growth of the country.

The short-run findings are presented in the bottom part of Table 5. According to the findings, gross capital formation positively impacts the economic growth of the country in the long run. Though results reveal that human capital negatively impacts economic growth, it is statistically insignificant. However, there is the possibility that the quality of education is not sufficient to provide sufficient skills for improving the economic performance of the country.

Finally, the short-run dynamics reveal that the coefficient of error correction term is significant, with a negative sign indicating the pace of adjustment in a year from short-run disequilibrium to long-run equilibrium.

**Table 5. Long-run and short-run results**

| Variables | Coefficients | Standard errors | T-test |
|---|---|---|---|
| Long-run | | | |
| LnPC | 0.22** | 0.08 | 2.69 |
| LnHC | 0.13 | 0.09 | 1.35 |
| LnTOP1 | -0.03** | 0.01 | -2.7 |
| Short-run | | | |
| LnPC | 0.09*** | 0.02 | 3.89 |
| LnHC | -0.11 | 0.07 | -1.52 |
| LnTOP1 | -0.02*** | 0.00 | -4.60 |
| DLnTOP1 | 0.01** | 0.00 | 2.92 |
| ECT(-1) | -1.27*** | 0.21 | -5.91 |
| Adj. R: 0.82 | | | |

Note: ***, **, * stands for 1 %, 5%, and 10% level of significance.

## 4.6. Diagnostics testing

Table 6 demonstrates the results of some diagnostic tests, which include serial correlation, heteroscedasticity, and normality, in addition to the functional form of the model. These tests confirm the validity of the estimated models. The results show that there is no serial correlation and heteroscedasticity. Finally, the Ramsey test indicates the functional form of the model used is correct.

**Table 6. Diagnostics checking**

| Diagnostics | Null hypothesis | F-statistic | Conclusion |
|---|---|---|---|
| LM test | H0: No serial correlation | 3.53 (0.08) | Do not reject H0 |
| ARCH | H0: Homoscedasticity | 0.02 (0.86) | Do not reject H0 |
| Breusch-Pagan-Godfrey | H0: Homoscedasticity | 0.36 (0.94) | Do not reject H0 |
| Normality | H0: Residuals are normally distributed | 4.36 (0.11) | Do not reject H0 |
| Ramsey test | H0: Functional form is correct | 0.23 (0.63) | Do not reject H0 |

## 5. Conclusion

The present study attempts to explore the link between trade openness, capital formation, and economic growth in the case of India. To achieve the objectives of the study, time-series data was collected from the WDI World bank for the period 1992-2019. Empirical literature indicates that different indicators of trade openness have been used in the available literature. Following Hye and Lau (2015), the composite trade openness index has been used in the present study to get a better idea of trade openness and economic growth in the case of India. The empirical findings show that trade openness negatively impacts the economic growth of the country. These findings are in line with the findings of Batra (1992), Batra and Slottje (1993), and Vamvakidis (2002). They argue that if trade liberalisation is not managed efficiently, it impedes the economic growth of a country. Kim (2011) found a negative relationship between trade openness and economic growth in the case of less developed countries. In addition, figure 1 shows that imports exceed exports in the case of India during the study period.

Thus, the policy implication from the present study is that there is a need to introduce trade reforms and necessary policy initiatives to expand exports. Though statistically insignificant, human capital also shows a negative relationship with economic growth in the short run. According to theoretical justification, it is the skilled labour force that enhances the economic growth of a country. Thus, the government of India needs to increase both efforts and expenditure to enhance the skill level of the abundant labour force. In the long run, it should be noted that it is quality of education and not school attainment that impacts the economic performance of a country. Domestic investment, which is considered a driver of economic growth, is positively contributing to the economic performance of India. Thus, policymakers of the country need to encourage investment by introducing various policy incentives for domestic as well as foreign investors.

**Acknowledgment:** The author is grateful to the anonymous referees of the journal for their extremely useful suggestions, which have improved the quality of the article.

## References

Adhikary, B. K. (2011). FDI, trade openness, capital formation, and economic growth in Bangladesh: A linkage analysis. *International Journal of Business and Management, 6*(1), 16-28. https://doi.org/10.5539/ijbm.v6n1p16

Aggarwal, A., & Kumar, N. (2012). *Structural change, industrialization, and poverty reduction: the case of India*. Development Paper, United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) South and South-West Asia Office. 1206. http://www.unescap.org/sites/default/files/SSWA_De ... per_1206_Nov2012.pdf.

Akcay, S., & Demirhan, E. (2005). The causal relationship between openness and economic growth: Evidence from selected MENA countries. *Yapi Kredi Economic Review, 16*(2), 77-83.

Bal, D. P., Dash, D. P., & Subhasish, B. (2016). The effects of capital formation on economic growth in India: Evidence from ARDL-bound testing approach. *Global Business Review, 17*(6), 1388-1400. https://doi.org/10.1177/0972150916660403

Barua, A., & Chakraborty, D. (2006, July). Liberalization, trade and industrial performance: an empirical analysis for India. 2nd APEA Conference, The Center for International Economics, University of Washington, Seattle.

Batra, R. (1992). The fallacy of free trade. *Review of International Economics, 1*(1), 19-31. https://doi.org/10.1111/j.1467-9396.1992.tb00004.x

Batra, R., & Slottje, D. J. (1993). Trade policy and poverty in the United States: Theory and evidence, 1947-1990. *Review of International Economics, 1*(3), 189-208. https://doi.org/10.1111/j.1467-9396.1993.tb00016.x

Chatterji, M., Mohan, S., & Dastidar, S. G. (2014). Relationship Between Trade Openness and Economic Growth of India: A Time Series Analysis. *Journal of Academic Research in Economics, 6*(1), 45-69.

Dash, R. K. (2009). Revisited export-led growth hypothesis: An empirical study on India. *South Asia Economic Journal, 10(*2), 305-324. https://doi.org/10.1177/139156140901000203

Grossman, G. M., & Helpman, E. (1989). Growth and welfare in a small open economy. *NBER working paper*, (w2970). https://doi.org/10.3386/w2970

Hye, Q. M. A. (2012). Long term effect of trade openness on economic growth in case of Pakistan. *Quality & Quantity, 46*(4), 1137-1149. https://doi.org/10.1007/s11135-011-9612-0

Hye, Q. M. A., & Lau, W. Y. (2015). Trade openness and economic growth: empirical evidence from India. *Journal of Business Economics and Management, 16(*1), 188-205. https://doi.org/10.3846/16111699.2012.720587

Intisar, R., Yaseen, M. R., Kousar, R., et al. (2020). Impact of trade openness and human capital on economic growth: a comparative investigation of Asian countries. *Sustainability, 12*(7), 1-19 https://doi.org/10.3390/su12072930

Kartal, Z., Zhumasheva, A., & Acaroglu, H. (2017). The effect of human capital on economic growth: A time series analysis for Turkey. In *Regional Studies on Economic Growth, Financial Economics and Management* (pp. 175-191). Springer, Cham. https://doi.org/10.1007/978-3-319-54112-9_11

Keho, Y. (2017). The impact of trade openness on economic growth: The case of Cote d'Ivoire. *Cogent Economics & Finance,* 5(1), 1332820. https://doi.org/10.1080/23322039.2017.1332820

Kim, D. H. (2011). Trade, growth and income. *The Journal of International Trade & Economic Development, 20*(5), 677-709. https://doi.org/10.1080/09638199.2011.538966

Kind, H. J. (2002). Endogenous growth and trade liberalization between small and large countries. *Review of International Economics, 10*(1), 151-165. https://doi.org/10.1111/1467-9396.00324

Klasra, M. A. (2011). Foreign direct investment, trade openness and economic growth in Pakistan and Turkey: An investigation using bounds test. *Quality & Quantity, 45*(1), 223-231. https://doi.org/10.1007/s11135-009-9272-5

Kong, Q., Peng, D., Ni, Y., Jiang, X., & Wang, Z. (2021). Trade openness and economic growth quality of China: Empirical analysis using ARDL model. *Finance Research Letters, 38*, 101488. https://doi.org/10.1016/j.frl.2020.101488

Leamer, E. E. (1995, February). A trade economist's view of US wages and globalization. In *Brooking Conference Proceedings*. Brookings.

Malefane, M. R., & Odhiambo, N. M. (2021). Trade openness and economic growth: empirical evidence from Lesotho. *Global Business Review, 22*(5), 1103-1119. https://doi.org/10.1177/0972150919830812

Marelli, E., & Signorelli, M. (2011). China and India: Openness, trade and effects on economic growth. *The European Journal of Comparative Economics,* 8(1), 129.

Mercan, M., Gocer, I., Bulut, S., & Dam, M. (2013). The effect of openness on economic growth for BRIC-T countries: Panel data analysis. *Eurasian Journal of Business and Economics, 6*(11), 1-14. https://www.ejbe.org/EJBE2013Vol06No11p001MERCAN-GOCER-BULUT-DAM.pdf

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics, 16*(3), 289-326. https://doi.org/10.1002/jae.616

Rivera-Batiz, L. A., & Romer, P. M. (1991). Economic integration and endogenous growth. *The Quarterly Journal of Economics, 106*(2), 531-555. https://doi.org/10.2307/2937946

Romer, P.M. (1990). The problem of development: a conference of the Institute for the study of free enterprise systems, *Journal of Political Economy. 98*(1), 1-11.

Sarkar, P. (2005). Is there any impact of trade liberalization on growth? Experiences of India and Korea. *Revue Tiers Monde, XLVI (*184), 907-927.

Sarkar, P. (2008). Trade openness and growth: Is there any link? *Journal of Economic Issues, 42*(3), 763-785. https://doi.org/10.1080/00213624.2008.11507178

Sengupta, S. (2020). How trade openness influenced economic growth in India: An empirical investigation. *Indian Journal of Economics and Development, 8(3)*, 1-14. https://doi.org/10.17485/IJED/v8.21

Singh, T. (2011). International trade and economic growth nexus in Australia: A robust evidence from time-series estimators. *The World Economy, 34*(8), 1348-1394. https://doi.org/10.1111/j.1467-9701.2011.01341.x

Su, D. T., Nguyen, P. C., & Christophe, S. (2019). Impact of foreign direct investment, trade openness and economic institutions on growth in emerging countries: The case of Vietnam. *Journal of International Studies, 12*(3), 243-264. https://doi.org/10.14254/2071-8330.2019/12-3/20

Tahir, M., & Hayat, A. (2020). Does international trade promote economic growth? An evidence from Brunei Darussalam. *Journal of Chinese Economic and Foreign Trade Studies, 13*(2), 71-85. https://doi.org/10.1108/JCEFTS-03-2020-0010

Topalova, P., & Khandelwal, A. (2011). Trade liberalization and firm productivity: The case of India. *Review of Economics and Statistics, 93(*3), 995-1009. https://doi.org/10.1162/RESTa00095

Vamvakidis, A. (2002). How robust is the growth-openness connection? Historical evidence. Journal of Economic Growth, 7(1), 57-80. https://doi.org/10.1023/A:1013418610712

Ved, P. & Sudesh, P. (2007). an empirical investigation of the casual; relationship between openness and economic growth in India, *Asian Economic Review, 49*(3), 485-494

Wacziarg, R. & Welch, K. H. (2008) Trade liberalization and growth: new evidence. *The World Bank Economic Review, 22*(2), 187-231. https://doi.org/10.1093/wber/lhn007

World Bank (1987) *World Development Report 1987,* https://doi.org/10.1596/0-1952-0563-4

World Bank (1991) *World Development Report 1991,* https://doi.org/10.1596/978-0-1952-0868-9

World Bank (1998) *World Development Report 1999/2000,* https://doi.org/10.1596/0-1952-1124-3

Yanikkaya, H. (2003). Trade openness and economic growth: A cross-country empirical investigation. *Journal of Development Economics, 72*(1), 57-89. https://doi.org/10.1016/S0304-3878(03)00068-3

Young, A. (1991). Learning by doing and the dynamic effects of international trade. *The Quarterly Journal of Economics, 106(*2), 369-405. https://doi.org/10.2307/2937942