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On

What affects (Domestic and Foreign) Investment in Bangladesh? Implications of Bangladesh's LDC Graduation for Domestic Investment and FDI

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Abstract

This paper investigates the multifaceted implications of Bangladesh's anticipated graduation from the group of least-developed countries (LDCs), particularly examining its impact on macroeconomic indicators such as domestic investment and foreign direct investment (FDI). With the loss of unilateral tariff preferences on the horizon, especially in critical markets like the EU, concerns arise about the potential challenges to Bangladesh's export competitiveness. However, amidst these challenges, the study unveils a positive narrative driven by the country's robust economic growth, identifying sectors poised for increased investment post-graduation. Employing rigorous theoretical frameworks and the recursive structural vector autoregression (SVAR) model over the sample period of 1986-2022, the research sheds light on the determinants of FDI, offering nuanced insights into the interconnected dynamics of macroeconomic variables. The results reveal that the contemporaneous coefficients are statistically significant in most of the cases. Moreover, the estimated impulse response functions show that most of the selected macroeconomic variables (GDP, consumption, domestic and foreign investment, govt. expenditure and exchange rate) respond negatively due to a one standard deviation positive exports shock. The paper concludes with policy implications, emphasizing the necessity of adaptive strategies to navigate challenges and leverage newfound opportunities, ultimately steering Bangladesh toward a trajectory of resilient economic growth and development.

Keywords: Least Developed Countries, Domestic Investment, Foreign Direct Investment, Economic Growth

JEL codes: C32, E17, E22, F47, F60

1 Introduction

As Bangladesh stands on the cusp of graduating from the group of least-developed countries (LDCs) designated by the United Nations, the consequential loss of unilateral tariff preferences granted by major global economies looms large. The European Union (EU), a pivotal market for Bangladesh, is expected to elevate tariffs for clothing exporters, which contributes over half of Bangladesh's export income.[1] Divergent views persist regarding the potential impact of this tariff rise on Bangladesh's export competitiveness. While some argue that exporters lack sufficient markups to absorb the tariff shock, others contend that Bangladesh, as a substantial and established supplier, possesses the market power to mitigate adverse implications stemming from LDC graduation.

The pivotal questions revolve around the response of the demand for Bangladesh's export products to these price changes and the extent to which exporters can navigate and absorb the impending tariff hikes. These questions form the crux of major policy considerations, as the consequences of losing preferential treatment in key export destinations extend beyond trade to impact both domestic and foreign direct investment (FDI). In the post-LDC graduation scenario, heightened competition is anticipated, potentially rendering Bangladesh less attractive for investment, particularly in the exporting sector.

However, amid the concerns, it's crucial to acknowledge that not all effects of LDC graduation on investment are negative. Bangladesh's graduation is a testament to its robust and sustained economic growth, particularly over the last two decades. This economic trajectory positions Bangladesh as an enticing market for businesses, both domestic and foreign, with many already expressing intentions to expand operations within the country. This anticipated surge in investment is expected to extend across diverse sectors, including energy, information technology and communication (ITC), pharmaceuticals, and food processing. Two key driving

[1] https://www.eeas.europa.eu/bangladesh/european-union-and-bangladesh_en?s=164

forces behind this expected surge are the substantial consumer base with significant purchasing power and the anticipated elevation of Bangladesh's bond ratings and financial instruments post-LDC graduation, instilling greater confidence among investors.

The paper employs robust theoretical frameworks for empirical investigations into the determinants of Foreign Direct Investment (FDI) in Bangladesh. Its overarching objective is to gauge the manifold impacts—both demand- and supply-side—on domestic investment and FDI following Bangladesh's LDC graduation. The contributions of the paper to the existing literature are multifaceted. Firstly, it scrutinizes the potential effects of LDC graduation on Bangladesh's export competitiveness, especially amidst heightened tariffs in major markets like the EU. The analysis navigates varying perspectives on how exporters might adapt, considering factors like markups and market power. Secondly, the study adopts theoretical frameworks for a comprehensive empirical exploration of FDI determinants in Bangladesh, thereby enriching the understanding of the dynamics post-graduation.

Furthermore, the paper contributes significantly by utilizing annual time series data spanning a substantial period (1986-2022) from the World Bank, ensuring a robust empirical foundation. Rigorous analytical methods, including stationary checks and the implementation of Structural Vector Autoregression (SVAR), fortify the study's empirical rigor. The recursive SVAR strategy illuminates the successive relationships between variables, unraveling their responses to external economic shocks. Additionally, the Impulse Response Function of SVAR facilitates a nuanced understanding of the short-term impacts of export earnings changes on various economic indicators.

Finally, the findings of the paper furnish valuable insights for policymakers, pinpointing potential challenges and opportunities post-graduation. These insights call for targeted policies that address concerns related to export competitiveness, investment allure, and sector-specific considerations. By navigating the complexities of post-LDC graduation scenarios, the paper contributes not only to academic discourse but also to the formulation of practical strategies that can guide Bangladesh in its transition to a new economic paradigm.

The remainder of the paper is structured as follows: Section 2 offers a concise review of pertinent literature addressing the macroeconomic determinants of economic growth and investment. Section 3 delineates the methodology and data utilized in the study. Descriptive

statistics and an examination of the stationarity of data series are presented in Section 4. The findings from the Structural Vector Autoregression (SVAR) analysis are detailed in Section 5. Section 6 provides a succinct discussion of the policy implications derived from the results. Finally, Section 7 offers concluding remarks for the paper.

2 Related studies

Investment is one of the economic concepts seen as the determinant of countries' economic development in the market economy context. That is why it is widely considered in a variety of economic studies. A significant part of the research is based on the examination of FDI as a critical determinant of economic growth and technological development because "the very essence of economic development is the rapid and efficient transfer and adoption of "best practice" across borders" (Kok & Ersoy, 2009).

Economic factors play a vital role in explaining investment flows from domestic and foreign sources. Most researchers focus on macroeconomic concepts as the main incentives for investment; among them, Market size (in terms of GDP) is the most commonly mentioned. Larger markets (economies) attracts a larger amount of investment, especially FDI, due to the influence of economies of scale in the context of market-seeking investments. In some cases, this factor may be the key determinant of foreign investment (Sharma & Bandara, 2010).

Although the name of this factor for each study differs, all investigations refer to Gross Domestic Product, either it is called Market size (Mateev, 2009; Riedl, 2010; Sharma & Bandara, 2010; Khachoo & Khan, 2012), Economic size (Tang, 2011), The size of the economy (Jurcau et al., 2011), Size of domestic market (Arbatli, 2011), or directly GDP (Hayakawa et al., 2013; Kersan-skabic, 2013). Nevertheless, the methodology is different, as for example Sharma & Bandara (2010) and Riedl (2010) apply the level of GDP in currency units, Mateev (2009) and Kersan-Skabic (2013) use GDP per capita, other researchers use the logarithm of GDP (Tang, 2011; Jurcau et al., 2011).

Almost all investigations discovered a positive significant effect of the Market size on FDI flows. Only Arbatli (2011) provided research showing a significant negative relationship between GDP per capita and FDI flows. The author suggests that this variable is related to the capital-to-labor ratio and, hence, the productivity of capital; countries with a lower level of per

capita income might attract more inflows, consistent with higher marginal productivity of capital. Although, these results are not confirmed by other research and cannot be considered relevant. Thus, the great majority of studies prove that Market Size is one of the most essential incentives influencing investors' decisions.

Being an indicator of high productivity in the economy, Market size growth can stimulate the attraction of investment. Each author suggests a different name for this factor, yet all refer to GDP growth. However, only a few studies obtained significant results: Noorbakhsh & Paloni (2001), Kok & Ersoy (2009), and Pearson et al. (2012). All these investigations emphasize GDP growth's positive influence on domestic investment and FDI. However, considering empirical results, we cannot affirm the existence of a reliable relationship between this factor and FDI.

Another macroeconomic factor that influences domestic investment and FDI flows is inflation, which measures instability at the macro level (Kersan-Skabic, 2013). However, only two out of four identified research obtained statistically significant results, although they were opposite and do not provide credible assumptions: Kok & Ersoy (2009) state that inflation affects negatively FDI flows, while Kersan-Skabic (2013) received a positive sign of the relation, contrary to expectations. It is widely known that openness to trade might stimulate the attraction of foreign investments. Therefore, Trade in its different aspects is found to be a determinant of foreign investment. However, only half of the detected research obtained statistically significant results: Kok & Ersoy (2009), Kersan-Skabic (2013), and Noorbakhsh & Paloni (2001) state that Trade has a positive impact on FDI flows, as expected.

Labor costs reflected in the level of wages are often seen as one of the main determinants of domestic investment FDI inflows, with low wages being regarded as an advantage in attracting foreign firms because of the diminution of production costs. However, the methodology of the variable forming is dissimilar: Du et al. (2012) and Hayakawa et al. (2013) use the average payment for manufacturing workers, Mateev (2009) utilizes the percentage change in the overall cost of labor, Khachoo & Khan (2012) apply the natural logarithm of the wage rate, whereas Riedl (2010) uses real unit labor costs. Nevertheless, as expected, all mentioned research have obtained significant results, with a predominantly negative sign of the relationship. Therefore,

we can easily deduct a potential working hypothesis based on the relationship between labor costs and investment.

Income is a factor that influences domestic investment, and FDI flows closely related to wages. It is not frequently mentioned in specialty literature, though we identified two authors who obtained significant results in analyzing different aspects of income in the context of FDI. However, the results are ambiguous and do not produce a concrete and relevant conclusion. The macroeconomic factor of the Exchange Rate is also considered to be an influential factor when studying foreign investment. Arbatli (2011) proposes two variables to investigate: Real exchange rate and Exchange Rate Classification. The first one does not have any statistically significant relationship with FDI. For Exchange Rate Classification, the author introduces dummy variables based on IMF's de facto classification of exchange rate arrangements and obtains significant results, stating that the exchange rate fixation or volatility affects foreign capital inflows.

Economic freedom is a variable that characterizes a market economy. It is a common opinion that the degree of economic freedom is associated with the attractiveness to foreign investors. Jimenez et al. (2011) introduce the Economic Index of Freedom in their model, while Pearson et al. (2012) use the variable Economic freedom. The relationship between this index and investment is negative because the study focuses on Spanish investment in Europe, mainly in countries with geographical and cultural proximity, which do not have relatively high Index scores (Jimenez et al., 2011). Pearson et al. (2012) utilize Fraser's Institute degree of economic freedom index, obtaining a positive and highly significant relationship. A high degree of economic freedom will increase FDI inflows. Therefore, we can affirm that the relationship exists, though its direction is unclear.

Several scientists investigate determinants of domestic investment and FDI that belong to Capital factors. Two variables that represent the Capital formation factor are introduced by Kok & Ersoy (2009): Domestic gross fixed capital formation and Gross capital formation, with a significant result only for the second variable. Holmes et al. (2013) use Capital Availability, which includes capital investments, money supply, net reserves, and total foreign debt. The research results suggest that economic institutions that provide capital availability discourage domestic investment and inward FDI.

Jurcau et al. (2011) utilize the variable Stock market capitalization to GDP ratio as a measure of the financial market's size, which positively impacts FDI inflows. Domestic credit is a factor connected to the previous one by describing the financial market and capital availability. It reflects the amount of credit provided to private sectors and has a significantly positive impact on cross-border investment. These two factors show that larger financial markets are more attractive to foreign investors (Jurcau et al., 2011). Though these factors may be significant in the context of a proper study, identified papers present single results, unconfirmed by several researchers.

Kok & Ersoy (2009) use in their research two variables to measure the impact of Debt on Foreign investment: Total external debt, which is the debt owed to nonresidents, and Total debt service as a percent of GDP. The authors obtain a significant result only for Total debt service, thus making the relevance of the Debt factor unclear in the context of future research.

Capital inflows are crucial and contributes to accelerate economic growth. Kumari and Sharma (2017) identified key determinants of FDI inflows in developing countries employing an unbalanced panel dataset, incorporating fixed effect model and random effect model with Hausman test. The estimated fixed effect models reveal that coefficients of market size, trade openness, human capital and interest rate are significant in relation to FDI inflow. Market size has found to be the most significant determinant of FDI inflow. Econometric studies involved analyzing various determinants that can influence FDI decision. On this note, Masca & Demirhan (2016) explored the determining factors of FDI inflow in developing countries by estimating a cross-sectional econometric approach. According to the estimated result, per capita GDP growth rate, telephone main lines, and degree of openness shows statistically significant and positive relationship to FDI inflows. Using the standard fixed effects model along with a dynamic panel approach, Economou et al (2017) critically examined components of FDI in 24 Organisation for Economic Co-operation and Development (OECD) countries and 22 developing (non-OECD) countries over 1980–2012. In the OECD nations' FDI inflows are highly influenced by lagged FDI, gross capital formation, market size, and corporation taxes. For developing countries, the most robust outcomes are found in lagged FDI, market size, labor cost and institutional variables.

3 Methodology and Data

We develop a Vector Autoregression (VAR) model. VAR is a key macroeconometric tool first proposed by Sims (1980), which won the Nobel Prize for it. VAR is a simple way to describe economic time series with minimal theoretical restriction. It summarizes the relationship between macroeconomic time series, which can be used to examine the responses of private investment and other macroeconomic aggregates to export shocks after the LDC graduation. A VAR is a regression model in which K variables are specified as linear functions of p of their own lags, p lag of the other K – 1 variables. Algebraically, a p-order VAR model, written as VAR(p), is given by:

$$y_t = v + A_1 y_{t-1} + \cdots + A_p y_{t-p} + u_t \tag{7}$$

where $y_t = (y_{1t,} \dots, y_{kt})'$ is a $K \times 1$ vector of variables, A_1 through A_p are $K \times K$ matrices of parameters, v is a $K \times 1$ vector of intercepts, and u_t is a $K \times 1$ vector of errors, which is assumed to be white noise, that is, $E(u_t) = 0, E(u_t u_t{}') = \sum$ and $E(u_t u_s') = 0 \; for \; t \neq s$. There are $K + pK^2$ number of coefficients and $K(K+1)/2$ number of elements in the variance-covariance matrix $\sum$. The right-hand side only contains predetermined variables of a stationary process, and the error terms are assumed to be serially uncorrelated with constant variance. So, we can estimate each equation by OLS.

This is an application of seemingly unrelated regression. In our case, the vector y_t contains macroeconomic variables, such as export earnings (USD), exchange rates (BDT per USD), GDP (USD), interest rates, consumption (USD), and Government expenditure (USD), and our target variables are domestic investment and FDI. Some limitations of this reduced form VAR are that it does not allow for simultaneous causality and shocks have to be serially uncorrelated and white noise. Since LDC graduation is likely to affect several macroeconomic aggregates for a number of years, these limitations make the reduced form VAR less useful in predicting the likely impacts of Bangladesh's LDC graduation on private investment and other macroeconomic variables. Hence, we also estimate a structural VAR model for these variables. A short-run structural VAR model can be written as:

$$A\big(I_K - A_1 L - A_2 L^2 - \cdots - A_p L^p\big) y_t = A\epsilon_t = B u_t \tag{8}$$

where L is the lag operator, A, B, and $A_1, \ldots, A_p$ are $K \times K$ matrices of parameters, ϵ_t is a $K \times 1$ vector of innovations with $\epsilon_t \sim N(0, \sum)$ and $E[\epsilon_t \epsilon_s{}'] = 0$ for all $s \neq t$, and u_t is a $K \times 1$ vector of orthogonal disturbances, that is, $u_t \sim N(0, I_K)$ and $E[u_t u'] = 0$ for all $s \neq t$. These transformations of the innovations allow us to analyze the dynamics of the system in terms of a change to an element of u_t. In a short-run structural VAR model, we obtain identification by pacing restrictions on A and B, which are assumed to be nonsingular.

Equation (8) implies that $P_{sr} = A^{-1}B$, where P_{sr} is the orthogonal matrix identified by a particular short-run structural VAR, which implies that $A\epsilon_t \epsilon_t' A' = B u_t u_t{}' B'$. Taking the expectation of both sides yields: $P_{sr} P_{sr}' = \sum$. We can invert the autoregressive representation of the model in (8) to an infinite-order, moving-average representation of the form:

$$y_t = \mu + \sum_{s=0}^{\infty} \Theta_s^{sr} u_{t-s} \tag{9}$$

whereby y_t is expressed in terms of the mutually orthogonal, unit-variance structural innovations u_t.The Θ_s^{sr} s contain the structural IRFs at horizon s.

In a short-run SVAR model, the A and B matrices model all the information about contemporaneous correlations. The B matrix also scales the innovations u_t to have unit variance. This allows the structural IRFs constructed from (9) to be interpreted as the effect on variable *i* of a one-time unit increase in the structural innovation to variable j after s periods.

P_{sr} identifies the structural IRFs by defining a transformation of $\sum$, and P_{sr} is identified by the restrictions placed on the parameters in A and B. Because there are only K(K + 1)/2 free parameters in $\sum$, only K(K +1)/2 parameters may be estimated in an identified P_{sr}. Because there are $2K^2$ total parameters in A and B, the order condition for identification requires that at least $2K^2 - K(K+1)/2$ restrictions be placed on those parameters. Amisano and Giannini (1997) derive a method to check that a structural VAR model is locally identified near some specified values for A and B. Now, suppose we write a short-run VAR as follows:

$$y_t = \bar{A}^{-1} B u_t$$

where $\bar{A} = A\left(I_K - A_1L - A_2L^2 - \cdots - A_pL^p\right)$. This implies that $\sum = BB'$, and denoting $C = \bar{A}^{-1}B$, which is the matrix of long-run response to the orthogonal shocks, and

$$y_t = Cu_t$$

In long-run model, the constraints for parameters' identification are placed on the elements of C, and free parameters are estimated. These constraints are often exclusion restrictions.

3.1 Restriction and Identification Scheme

Existing works of literature proposed two types of identification strategies to impose restrictions on contemporaneous matrix, namely recursive and non-recursive. This study adopts recursive SVAR strategy to show successive relationships between variables to identify export shocks due to LDC graduation. This strategy is one of the most commonly used identification schemes for VAR. This technique requires Cholesky factorization to identify structural innovations from the reduced form VAR. Lower (upper) triangular assumption on the structural residuals is called a Cholesky decomposition.

The absence of reverse causality and omitted variables are not correlated with lower-ordered variables and higher-ordered variables making it a strong assumption. Ordering of the relevant variables are important factor to be cared about. Variables are ordered logically by placing the most exogenous variable in higher order. Variables placed in top order are said to have contemporaneous effects on the lower-ordered variables. In another way, we can say that the first variable is affected only by its shocks and it will not have any contemporaneous effect of shocks by other variables.

Ordering might sound innocuous but it is not. If there are n number of variables then it is possible to construct $n!$ orderings. These are short-run restrictions that have been proven to be performed remarkably well (Christiano et al., 2006). Timing constraints are essentially exclusionary constraints that indicate that some of the structural innovations or shocks do not immediately influence particular X variables. In our analysis, the recursive system involved will introduce successive linkages between macroeconomic time series to examine the impact of export earnings shocks. The logic behind the ordering of this paper has been considered following various literature works that are consistent from the country's perspective. The

restrictions on contemporaneous matrix B^{-1} or B for Bangladesh SVAR model are summarized in the following equation:

$$\begin{bmatrix} {\varepsilon_t}^x \\ {\varepsilon_t}^y \\ {\varepsilon_t}^c \\ {\varepsilon_t}^g \\ {\varepsilon_t}^r \\ {\varepsilon_t}^i \\ {\varepsilon_t}^f \\ {\varepsilon_t}^{ex} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ b_{21} & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ b_{31} & b_{32} & 1 & 0 & 0 & 0 & 0 & 0 \\ b_{41} & b_{42} & b_{43} & 1 & 0 & 0 & 0 & 0 \\ b_{51} & b_{52} & b_{53} & b_{54} & 1 & 0 & 0 & 0 \\ b_{61} & b_{62} & b_{63} & b_{64} & b_{65} & 1 & 0 & 0 \\ b_{71} & b_{72} & b_{73} & b_{74} & b_{75} & b_{76} & 1 & 0 \\ b_{81} & b_{82} & b_{83} & b_{84} & b_{85} & b_{86} & b_{87} & 1 \end{bmatrix} \begin{bmatrix} {\mu_t}^x \\ {\mu_t}^y \\ {\mu_t}^c \\ \mu^g \\ {\mu_t}^r \\ {\mu_t}^i \\ {\mu_t}^f \\ \mu^{ex} \end{bmatrix}$$

Here, x=export earnings, y = GDP, g = govt. expenditures, c = private consumption, r = interest rate, i = domestic investment, f = foreign direct investment, ex = exchange rate.

A country's exporting activities can influence GDP and its components, interest rate, and exchange rate. The right-hand side of the above equation presents vector of structural shocks. The vector on the left-hand side shows shocks from the reduced form which are responsible for the unexpected movement of each macro variable. The recursive structure followed by the above equation assumes that export earning has contemporaneous effect on the other seven variables and is assumed to be the most exogenous variable.

Therefore, exports are not contemporaneously affected by the other variables in consideration. GDP has contemporaneous impact on all the variables except export earnings. A higher level of consumption stimulates aggregate demand causing real GDP to rise. Economic theory suggests that increase in government expenditure through taxes has negative effect on household consumption by reducing their income. Government spending shocks lead an upward pressure on interest rate. Investment has inverse relationship with interest rate. Domestic investment has a strong impact in attracting foreign direct investment inflows. And finally, currency exchange rate which has been considered the least exogenous variable, has no contemporaneous effect of any of the variables.

3.2 Impulse Response Function (IRF) and Forecast Error Variance Decomposition (FEVD)

IRFs describe how the K endogenous variables react over time to a one-time shock to one of the K disturbances. In our case, the shock is in export earnings because of LDC graduation, and the endogenous variables are the other macroeconomic variables, including domestic investment and

FDI. Because the disturbances may be contemporaneously correlated, these functions do not explain how variable *i* reacts to a one-time increase in the innovation to variable j after s periods, holding everything else constant. To explain this, we must start with orthogonalized innovations so that the assumption to hold everything else constant is reasonable. Recursive VAR uses a Cholesky decomposition to orthogonalize the disturbances and thereby obtain structurally interpretable IRFs. Structural VAR use theory to impose sufficient restrictions, which need not be recursive, to decompose the contemporaneous correlations into orthogonal components.

FEVDs are another tool for interpreting how the orthogonalized innovations affect the K variables over time. The FEVD from *j* to *i* gives the fraction of the s-step forecast-error variance of variable *i* that can be attributed to the *j*th orthogonalized innovation. Using the IRFs and FEVDs, we can predict the effects of negative shocks in export earnings due to the LDC graduation on private investment in Bangladesh.

Next, we estimate the supply-side effects of LDC graduation, such as employment and job loss. Then, we use the structural VAR model, add the total employment to the list of macroeconomic variables, re-estimate the structural VAR model, and obtain the IRF and FEDV of a negative shock in private investment because of export income shocks after the LDC graduation. This provides us with the dynamics of employment as well as private investment in the post-LDC era in Bangladesh. To estimates these VAR model.

3.3 Data Source and Descriptions

Annual time series data are used spanning from the period 1986 to 2022. Data for some of the variables are found to be unavailable (missing) and contain negative values causing problems in log transformation due to which we have ignored datasets from 1972 to 1985**.** For example, the actual negative values of FDI net inflows appears to be missing for the period of 1979, 1984 and 1985 when the data is logarithmically converted. Logarithmic transformation is applied only to positive values. Moreover, actual data for lending rate were absent for the period of 1973, 1974 and 1975. All the series are retrieved from the world development indicators published by the World Bank website.[2]

[2] Source of Data: https://databank.worldbank.org/source/world-development-indicators

Table 1: Description of Variables

Variable	Description
Export Earnings	Exports of goods and services (constant 2015 USD)
Exchange Rate	Official exchange rate (LCU per USD, period average)
Gross Domestic Product (GDP)	Gross Domestic Product (constant 2015 USD)
Consumption	Households and NPISHs Final Consumption Expenditure (constant 2015 USD)/Private Consumption
Govt. Expenditure	General Govt. Final Consumption Expenditure (constant 2015 USD)
Interest Rate	Lending Interest Rate (%)
Investment	Gross Capital Formation (constant 2015 USD)/ Domestic Investment
Foreign Direct Investment (FDI)	Foreign Direct Investment, net inflows (BoP, current USD)

Source: World Development Indicators (World Bank)

The selection of these macroeconomic variables is based on economic viewpoints. Investment decisions are sensitive to the changing behavior of the economic conditions. Investors consider a lot of factors when they decide to invest in long-term projects. Economic variables are interlinked. Volatile domestic market creates uncertainty leading to risk aversion among investors. On this note, to capture the overall economic performance this paper incorporated GDP and its components. A stable currency reduces perceived risk for investors creating opportunities for higher returns. Fluctuations in exchange rate has significant effect on export competitiveness and attractiveness of FDI. This is the reason of introducing exchange rate variable. The inclusion of Interest rate, a monetary policy tool, is chosen to represent cost of borrowing to finance investment.

4 Descriptive statistics and Stationary Check

The descriptive statistics table (Table 2) furnishes a concise summary of key variables under investigation, centering on the repercussions of Bangladesh's anticipated graduation from the group of least-developed countries (LDCs) on macroeconomic indicators. Particularly, the focus lies on domestic investment and Foreign Direct Investment (FDI). The variables analyzed include the natural logarithm of Gross Domestic Product (ln GDP), Consumption (ln consumption), Domestic Investment (ln inv), Foreign Direct Investment (ln fdi), Exports (ln exports), Government Expenditure (ln govt exp), Interest Rate (ln interest rate), and Exchange Rate (ln ex rate).

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ln GDP	37	25.404	0.581	24.547	26.445
ln consumption	37	25.208	0.455	24.561	26.081
ln inv	37	23.879	0.857	22.566	25.328
ln FDI	37	18.808	2.797	12.421	21.764
ln exports	37	22.897	1.286	20.843	24.568
ln govt exp	37	22.453	0.613	21.628	23.552
ln interest rate	37	2.493	0.187	1.963	2.698
ln ex rate	37	4.033	0.349	3.415	4.519

Source: Author's estimation using WDI data.

Examining ln GDP, the average log-transformed Gross Domestic Product across the 37 observations is approximately 25.404. This metric provides a measure of the central tendency of the data. The standard deviation of 0.581 indicates the extent of variability around this mean, with observations ranging from a minimum of 24.547 to a maximum of 26.445. Moving to ln consumption, the mean of 25.208 suggests the average log-transformed consumption over the observation period. With a standard deviation of 0.455, this variable exhibits less variability compared to ln GDP. Analyzing ln inv (Natural Log of Domestic Investment), the average log-transformed value is approximately 23.879, showcasing the mean domestic investment. The standard deviation of 0.857 implies notable variability in domestic investment levels.

Turning to ln FDI (Natural Log of Foreign Direct Investment), the mean log-transformed FDI is approximately 18.808. The standard deviation of 2.797 signifies substantial variability, reflecting diverse levels of foreign direct investment across observations. For ln exports (Natural Log of Exports), the mean of 22.897 represents the average log-transformed export value, with a standard deviation of 1.286 indicating variability around this mean. Examining ln govt exp (Natural Log of Government Expenditure), the mean is approximately 22.453, reflecting the average log-transformed government expenditure. With a standard deviation of 0.613, this variable demonstrates a certain degree of variability. Considering ln interest rate (Natural Log of Interest Rate), the mean of 2.493 signifies the average log-transformed interest rate, while the standard deviation of 0.187 suggests relatively low variability. Lastly, ln ex rate (Natural Log of Exchange Rate) exhibits a mean of 4.033, representing the average log-transformed exchange rate. The standard deviation of 0.349 indicates variability in exchange rate values. In essence, these descriptive statistics serve as foundational insights into the distributional characteristics of each variable, providing a basis for subsequent in-depth analyses within the paper.

Before estimating the SVAR model, the data that have been collected for estimation purposes must satisfy stationary properties. All the series have to be stationary and integrated at the same order. The Augmented Dickey-Fuller (ADF) unit root test is conducted to identify whether the data used in this study are stationary or not. The data are converted into natural logarithmic unit for estimation purposes. The null hypothesis for conducting the ADF test involves the presence of unit root or non-stationarity of the time series variables. Real GDP, export earnings, real consumption, real government expenditure, foreign direct investment, lending rate, domestic investment, and exchange rate are found to be non-stationary at their level form, I(0). However, the variables become stationary after taking their first difference (integrated of order one).

Table 3: Unit Root Test

Variable	Level/1st Difference	ADF Statistics	Remarks
ln_exports	Level	-1.028	I(1)
	1st Difference	-4.727***	
ln_GDP	Level	5.782	I(1)
	1st Difference	-3.408***	

ln_consumption	Level	3.247	I(1)
	1st Difference	-4.576 ***	
ln_govt.expenditure	Level	2.296	I(1)
	1st Difference	-3.833***	
ln_investment	Level	1.593	I(1)
	1st Difference	-4.806***	
ln_fdi	Level	-1.401	I(1)
	1st Difference	-6.773***	
ln_lending.rate	Level	1.108	I(1)
	1st Difference	-4.515***	
ln_exchange.rate	Level	-1.461	I(1)
	1st Difference	-4.371***	

Source: Author's estimation using WDI data. Note: ***p<0.01, **p<0.05, *p<0.10.

5 Results of Recursive VAR

This analysis considered some major macroeconomic variables to see their response to the export shock. SVAR allowed us to estimate the effect of contemporaneous coefficients. Contemporaneous or simultaneous linkages among variables make the analysis more understandable in examining the responsiveness of macroeconomic aggregates. The SVAR approach allows us to predict or forecast variables in response to sudden economic shocks. Impulse response functions or IRFs help us graphically to observe the movement of endogenous variables due to a shock in the exogenous variables. By estimating IRFs, one can see how sensitive major macroeconomic variables considered in this study to a shock in the export earnings. Short-run constraints on the SVAR model are necessary for the identification of export shocks which requires imposing logical restrictions on the contemporaneous matrix.

The structural VAR model has allowed us to impose constraints on the structural parameters and the residual variance-covariance matrices to a theoretical consideration. Such restriction allows us to examine the impact of each independent shock. The diagonal elements of the A matrix are set to unity as a restriction and upper triangular values of the main diagonal elements are set to

zero. The values of lower triangular elements of the A matrix is be estimated. The output of SVAR focuses on the estimation of the A and B matrices. The contemporaneous effects for the export earnings can be easily demonstrated from the A matrix estimation result provided in the appendix section.

The table 4 provides the estimation result of the recursive structural vector autoregression model. The usual OLS technique is applied to estimate the coefficients of SVAR identification restrictions. The SVAR approach provides the linkages of both simultaneous (contemporaneous) and lagged or predetermined variables in the system of equations. SVAR outputs or estimations are basically the results derived from the benchmark VAR. The ordering framework of SVAR states that the variables are contemporaneously affected by the preceding variables and they do not have contemporaneous effect by the succeeding variables. The results in the following table shows the estimated contemporaneous parameters which are consistent with their respective equation. Most of the estimated contemporaneous coefficients are found to be statistically significant with appropriate sign. In Structural VAR model, coefficients attached to the contemporaneous variables may be treated as dependent or exogenous variables. The off-diagonal outputs of the A matrix are the negative of the actual contemporaneous effects.

The estimated coefficient b_{21} appears to be significant with a lower standard error implying that GDP tends to rise in a situation of positive export shock. However, parameter b_{31} turned out insignificant implying that there is no direct relationship between the level of consumption and the export earnings. The coefficient attached to the GDP in the consumption equation (b_{32}) is significant. A higher level of GDP has a positive effect on consumption. All the contemporaneous coefficients attached to the government expenditure equation are statistically significant with appropriate signs.

The fall in government expenditure put a downward pressure on interest rate (b_{54}). The parameters $b_{61,}\ b_{63}\ and\ b_{65}$ are significant implying that change in the level of GDP, consumption and interest rate influence country's domestic investment. A lot of factors influence country's foreign direct investment. The SVAR estimates reveal that most of the contemporaneous coefficients linked to the foreign direct investment equation are statistically significant. The coefficient (b_{81}) being significant implies that exports shock can have a positive

impact on a country's exchange rate. Country's currency tends to appreciate when volume of exports rises due to high demand. The estimated results suggested that government spending, interest rate and domestic investment has significant relationship in influencing country's exchange rate.

Table 4: Estimated Contemporaneous Coefficients of SVAR: Recursive Model

Restrictions	Coefficients	Std.error
b_{21}	-0.0474679***	.010617
b_{31}	-0.038593	.0243055
b_{32}	-1.128569***	.311555
b_{41}	-0.1401425***	.0352676
b_{42}	-1.747653***	.5135026
b_{43}	0.9911282***	.2401032
b_{51}	-0.1352399	.0885996
b_{52}	-1.752103	1.234323
b_{53}	0.377085	.6107119
b_{54}	0.7170448**	.3560279
b_{61}	-0.0474819*	.0266312
b_{62}	-0.3804858	.3693997
b_{63}	0.3407636**	.1785763
b_{64}	0.0369016	.1095276
b_{65}	-0.1483979***	.0498685
b_{71}	-3.801958***	1.048126
b_{72}	-68.43344***	14.11831
b_{73}	17.64286***	7.071813
b_{74}	12.28154***	4.129157
b_{75}	5.174799***	2.107188
b_{76}	6.390535	6.454678
b_{81}	-0.1098742***	.0446365
b_{82}	-0.0260442	.6638898
b_{83}	0.0596119	.2781461
b_{84}	0.2799924*	.1676175
b_{85}	-0.2551522***	.0826799
b_{86}	0.4474362**	.2367472

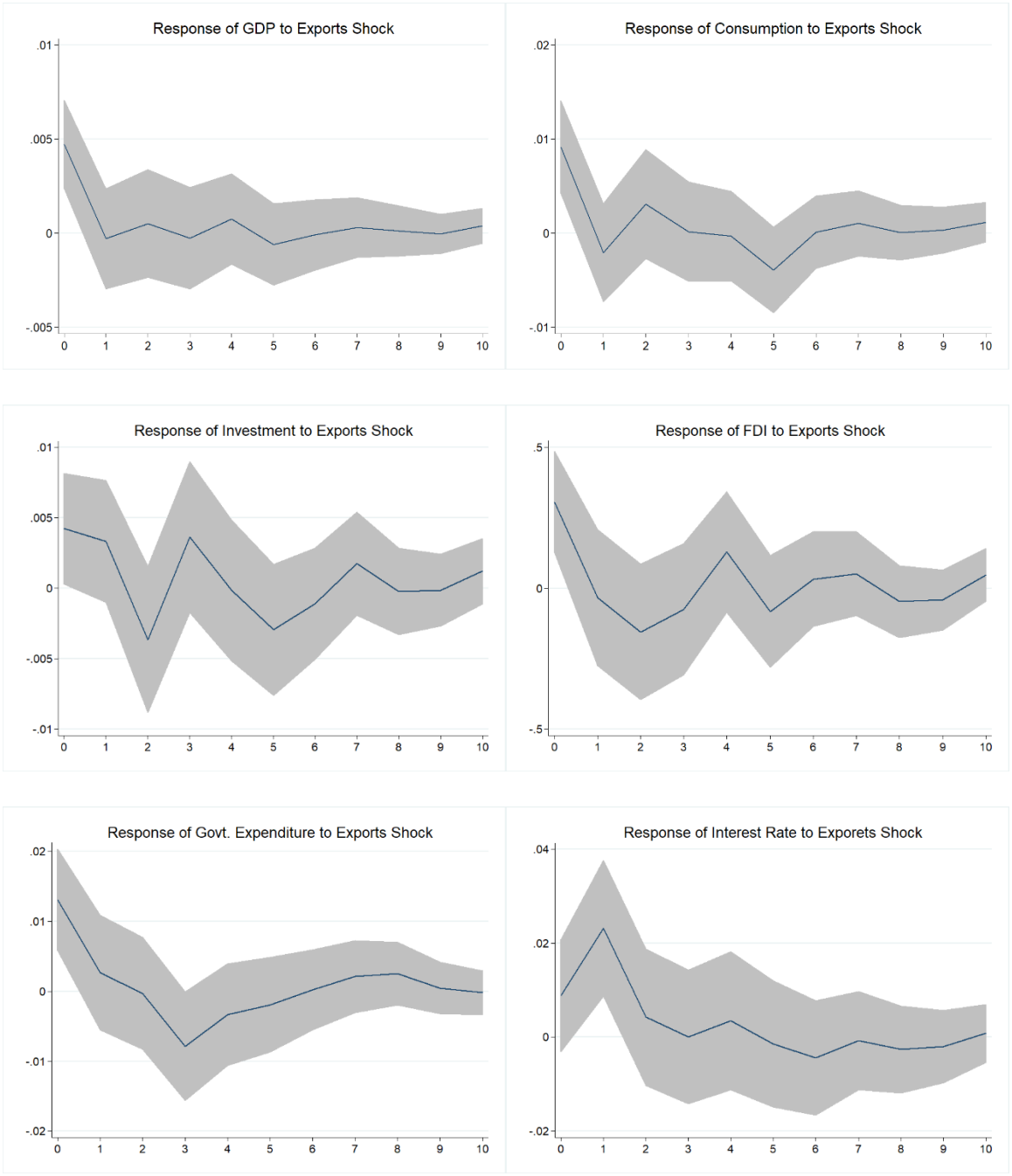
b_{87}	0.0045802	.0062015
b_{11}	0.0992088***	.0120308
b_{22}	0.0061421***	.0007448
b_{33}	0.0111581***	.0013531
b_{44}	0.0156216***	.0018944
b_{55}	0.0324302***	.0039327
b_{66}	0.0094301***	.0011436
b_{77}	0.3549199***	.0430404
b_{88}	0.0128342***	.0015564
Log-likelihood	618.4708	

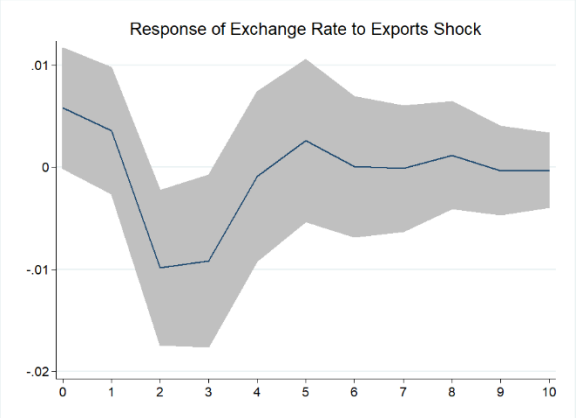
Source: Author's estimation using WDI data. Note: ***p<0.01, **p<0.05, *p<0.10

5.1 Analysis of Impulse Response Functions (IRF)

IRF graphically provides us with the dynamic response of different variables to a shock. Figure 1 plotted the estimated impulse response functions of macroeconomic variables to an exports shock. The horizontal axis represents the unit of time that our VAR model is estimated. In this case, the IRFs will show the effects of a shock over 10 years. One might be interested to know the exact years or periods in which the shocks occur. However, the specific years can't be specified explicitly on the graph itself. If we say, the shock is given in the year 1986 then years on the horizontal axis would represent the subsequent 10 years (1986 to 1995).The emphasis should be focused on observing the dynamic response patterns of the variables. Here, the vertical axis represents percentage variation. The grey area of impulse response function shows 95% standard error confidence bands. These impulse response functions show the extent of the changes in the endogenous macroeconomic variables following a positive exports shock of one standard deviation. It is clearly observable from the following figure that a positive shock in export earnings has an immediate short-run impact on most of the macroeconomic series.

Figure 1: Impulse Responses of a One Standard Deviation Positive Exports Shock





Source: Author's presentation using WDI data.

The following table provides the estimated results of these impulses. The real GDP started to decline after the initial positive shock given to the export earnings and fluctuated over the period. It reaches its highest peak of 0.000747 in the fourth period. Consumption immediately falls due to the positive shock and reaches its highest level of 0.00310 in the second period. It maintained its declining trend up to the fifth period and then started to rise slowly. The response of govt. expenditure exhibits a declining trend initially but value remains positive. Until the fifth period it maintained its declining trend with negative values.

After the fifth period a gradual upward trend is observed. Domestic investment responds negatively to this shock and fluctuation is evident over the sample periods. Foreign direct investments continue to fall up to third period and reaches its top (0.128083) in the fourth period. Only the Interest rate respond positively to this sudden exports shock. However, it declines gradually in the upcoming periods. This exports shock causes exchange rate to fall sharply after the first period. Therefore, exports shock causes most of the macroeconomic variables to decline on the economy of Bangladesh. Although the effect of the shock vanishes after a certain period, it is seen from the graphs and table that a one standard deviation positive shock has led macroeconomic variables to respond immediately.

Table 5: Impulse Response Functions Table Values

Period	dln_y	dln_c	dln_g	dln_r	dln_i	dln_f	dln_ex
0	0.00471	0.00914	0.01307	0.0088480	0.004217	0.304871	0.005792
1	-0.00029	-0.00208	0.00265	0.023117	0.003319	-0.03348	0.003573
2	0.000517	0.00310	-0.00029	0.004233	-0.00364	-0.15476	-0.00984
3	-0.00026	0.00016	-0.00785	0.000066	0.003632	-0.07477	-0.00917
4	0.000747	-0.00029	-0.00331	0.003476	-0.00017	0.128083	-0.00088
5	-0.00059	-0.00389	-0.00191	-0.001432	-0.00295	-0.08221	0.002613
6	-0.00008	0.00009	0.000218	-0.004377	-0.00111	0.032296	0.000045
7	0.00030	0.001047	0.002094	-0.00072	0.001741	0.05147	-0.00013
8	0.00013	0.000071	0.002482	-0.00263	-0.00022	-0.04738	0.001188
9	-0.00003	0.000345	0.000476	-0.001992	-0.00015	-0.04164	-0.00032
10	0.00039	0.001164	-0.00019	0.000815	0.001219	0.047477	-0.00027

Source: Author's estimation using WDI data.

6 Discussion and policy implications

Bangladesh stands at a pivotal juncture as it approaches graduation from the group of least-developed countries (LDCs). The transformative shift demands a multifaceted policy approach to navigate challenges and harness the potential for sustained economic growth. The empirical findings suggested that positive exports shock has led to higher domestic and foreign investment along with some other major macroeconomic aggregates . Both the domestic and foreign investment declines after the initial positive shock up to second period and then increases with a fluctuating pattern over the periods. The following discussion provides some suggestions and strategies to subside the negative impact on domestic and foreign direct investment in the post-LDC graduation. .

First, the anticipated tariff increases, particularly in the EU, could result in export loss and a concomitant loss in domestic investment and FDI as suggested by the estimated impulse response functions. To overcome this negative impact on export and investment, policymakers should consider a multi-pronged strategy, including investing in technology and innovation,

enhancing product quality, and diversifying export products. Furthermore, fostering partnerships with emerging markets can provide alternative avenues for sustained export growth.

Second, recognizing the potential post-graduation decline in attractiveness for both domestic and foreign investors as exports from Bangladesh would likely to be negatively impacted, policymakers should institute targeted incentives. Strategic sectoral focus is crucial, with emphasis on high-potential industries such as energy, information technology and communication (ITC), pharmaceuticals, and food processing. Implementing investor-friendly policies and ensuring regulatory ease will encourage capital inflows.

Third, the expected improvement in Bangladesh's credit rating post-graduation presents a unique opportunity to strengthen financial instruments. Policymakers should actively work towards developing a robust financial sector, enhancing bond markets, and promoting avenues for diverse investment instruments. This can contribute to increased investor confidence and create a conducive financial environment, and help lower the negative impact on investment due to any negative shock to exports.

Fourth, leveraging the large consumer base with significant purchasing power requires targeted policy interventions. Policymakers can focus on initiatives that stimulate domestic demand, including income support programs, consumer education, and infrastructure development. Strengthening the domestic market can act as a buffer against external negative shocks in post-LDC period, fostering economic resilience.

Fifth, the empirical findings underscore the need for proactive measures to address export shocks. Policymakers should develop contingency plans, establishing mechanisms for swift responses to sudden changes in export earnings. This involves close collaboration with industry stakeholders, ensuring a coordinated effort to mitigate the short-term impacts on the economy.

Sixth, given the dynamic nature of global economic conditions, policymakers must institute robust monitoring mechanisms. Regular assessments of the post-graduation scenario, coupled with adaptive policy frameworks, can facilitate timely adjustments. This approach ensures that policies remain responsive to evolving economic conditions, maintaining a dynamic and resilient economic landscape.

Seventh, sustained economic growth, a precursor to graduation from the LDC list, requires an improved investment climate. Policymakers should focus on initiatives that streamline bureaucratic processes, enhance infrastructure, and create an environment conducive to innovation and entrepreneurship. This comprehensive approach fosters an attractive investment climate, supporting long-term economic development.

In conclusion, a nuanced and comprehensive policy framework is imperative for Bangladesh's successful transition from an LDC. By strategically addressing challenges and capitalizing on emerging opportunities, policymakers can steer the nation towards a trajectory of sustainable and inclusive economic growth in the post-graduation era.

7 Conclusion

The comprehensive analysis presented in this paper sheds light on the intricate dynamics surrounding Bangladesh's impending graduation from the group of least-developed countries (LDCs) and its far-reaching implications on macroeconomic indicators, particularly domestic investment and foreign direct investment (FDI). The multifaceted nature of this transition demands a nuanced understanding of the challenges and opportunities that lie ahead.

The loss of unilateral tariff preferences in major economies, particularly the anticipated tariff rise in the EU, poses a significant challenge to Bangladesh's export competitiveness. The differing perspectives on the ability of exporters to absorb these tariff shocks underscore the complexity of the issue. As the country faces heightened competition post-LDC graduation, the repercussions on domestic investment and FDI are anticipated to be substantial, especially in sectors traditionally reliant on export activities.

However, amidst these challenges, there exists a contrasting narrative fueled by Bangladesh's robust and sustained economic growth. The country's graduation from the LDC list signifies its emergence as a lucrative market, attracting interest from both domestic and foreign businesses. Sectors such as energy, information technology and communication (ITC), pharmaceuticals, and food processing are poised to witness increased investment. The substantial consumer base and the expected improvement in credit ratings post-graduation serve as enticing factors for investors, providing a silver lining amid uncertainties.

The empirical investigations, anchored in appropriate theoretical frameworks, unravel the determinants of FDI in Bangladesh, emphasizing both demand- and supply-side factors. The application of the recursive structural vector autoregression (SVAR) model allows for a granular examination of the impact of export shocks, offering valuable insights into the interconnectedness of macroeconomic variables.

Policy implications emanating from this study are pivotal for steering Bangladesh through this transitional phase. Strategies to enhance export competitiveness, attract investments in strategic sectors, and capitalize on the burgeoning consumer base must be prioritized. The policy landscape should be adaptive, incorporating measures to address short-term shocks and foster long-term resilience.

In essence, while the challenges of LDC graduation are evident, Bangladesh stands at the cusp of a transformative era with prospects for sustained growth and development. The findings of this study underscore the importance of agile policymaking to harness opportunities, mitigate risks, and propel Bangladesh toward a trajectory of inclusive and resilient economic advancement.

Appendix

Table: A Matrix

Variable	dln_x	dln_y	dln_c	dln_g	dln_r	dln_i	dln_f	dln_ex
dln_x	1	0	0	0	0	0	0	0
dln_y	-.04746	1	0	0	0	0	0	0
dln_c	-.03859	-1.1285	1	0	0	0	0	0
dln_g	-.14014	-1.7476	.9911282	1	0	0	0	0
dln_r	-.13523	-1.7521	.377085	.7170448	1	0	0	0
dln_i	-.04748	-.38048	.3407636	.0369016	-.148397	1	0	0
dln_f	-3.8019	-68.433	17.64286	12.28154	5.174799	6.390535	1	0
dln_ex	-.10987	-.02604	.0596119	.2799924	-.25515	.4474362	.0045802	1

Source: Author's estimation using WDI data.

Table : B Matrix

Variable	dln_x	dln_y	dln_c	dln_g	dln_r	dln_i	dln_f	dln_ex
dln_x	.0992088							
dln_y	0	.0061421						
dln_c	0	0	.0111581					
dln_g	0	0	0	.0156216				
dln_r	0	0	0	0	.0324302			
dln_i	0	0	0	0	0	.0094301		

dln_f	0	0	0	0	0	0	.3549199	
dln_ex	0	0	0	0	0	0	0	.0128342

Source: Author's estimation using WDI data

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