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Original Research Article

The Impact of Foreign & Domestic Investment on Export Processing Zones in Bangladesh: An Auto Regressive Distributed Lag (ARDL) Approach

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Abstract

Foreign Direct Investment (FDI) is a major force behind the integration of the global economy and has the potential to boost economic development in both investing and those receiving the investment. The majority of the study focuses on the influence of FDI on Bangladesh's economic growth. A number of scholars have also looked at how FDI affects trade, domestic investment and other economic sectors. But surprisingly less research has been done on the effects of FDI on Bangladesh's export processing zones (EPZs). This study tries to investigate the impact of foreign and domestic investment on exports of EPZs between 2011-2022. To investigate EPZs export, this study used the Auto Regressive Distributed Lag (ARDL) approach. The Wald test was used to determine the direction of causation. The ARDL estimate shows that investment, GDP and FDI all have a positive correlation with rising EPZ export. The coefficient for FDI inflows is 0.15% which suggests that if FDI inflows raise by 1%, EPZ export will grow by 0.15% while all other factors stay constant. It also shows that a 1% increase in investment leads to 1.32% quicker growth in EPZ exports, assuming all other factors remain constant. The Wald test demonstrates the bilateral causal relationship between EPZ export & FDI and the unidirectional relationship between EPZ export & GDP. Therefore, Bangladesh must take immediate measures to protect potential foreign investors in order to provide a welcoming environment so that they can feel their contribution in the Bangladeshi business industry is respected.

Keywords: FDI, EPZ, Export, GDP, Causality, ARDL

Jel Code: C32, F35, H53, H54.

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1. INTRODUCTION

"Foreign Direct Investment" (FDI) is defined as an investment made by an individual, organization or government from one country into commercial interests in another one. Additionally, any subsequent transactions between the investor and the enterprise as well as among enterprises-both incorporated associated and unincorporated-are included in the definition of direct investment. It is mentionable that a direct investment enterprise may possess 10% or more of an incorporated corporation's common shares or voting rights or the equivalent of such rights in the case of an unincorporated business (IMF, Balance of Payment Manual, 5th supplement, 1993, page-86).

FDI plays a significant role in promoting economic development, fostering technological advancement and improving living standards in host countries. So, many actions have also been made to encourage FDI. One such attempt was the enactment of the BEPZA Act 1980. The BEPZA is the government body responsible for promoting, luring and facilitating foreign investment in Bangladesh's economic parks. Export-oriented companies in these industrial parks known as EPZs, are eligible for duty-free imports. The establishment of an EPZ in a nation serves multiple purposes. The main goal is to draw in FDI and activate it for many goals including quick industrialization, opening up job opportunities in a nation, technology transfer etc. (Fakir et al., 2013)

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The goal of the Bangladeshi government's open-door policy is to draw FDI into the country in order to accelerate industrialization through strong economic growth. For this aim, BEPZA, the government of Bangladesh's representative body, is operational. In certain economic zones, this organization seeks to draw in, support and enable foreign investment (Rahman, 2012).



Figure 1: Location of EPZs Source: BEPZA

(Bangladesh Economic Review, 2019) states that the creation of the economic zone is making significant progress toward the country's goal of becoming a middle-income state by 2021. It also serves to promote bilateral interest and prosperity by drawing in both domestic and foreign investment. Currently, FDI inflows into various sectors are as follows:



Figure 2: FDI inflows (net) by EPZ, Non EPZ and EZ Areas Source: Statistics Department, Bangladesh Bank (January-June, 2023)

From January to June of 2023, net foreign direct investment (FDI) inflows into all EPZ areas totaled USD 182.20 million or 12.6% of all net FDI inflows. 12.4% of all net FDI inflows during the July–December 2022 period was USD 224.26 million.

2. LITERATURE REVIEW

2.1. Theoretical background

2.1.1. The theory of export-led growth (ELG)

The main concept of this theory is that a country can achieve economic growth and development by expanding its export. This idea contends that by specializing in creating goods and services that it can efficiently create and exporting to other countries, a country can boost general economic growth (Olson *et al.*, 2014). Many experts praised the ELG hypothesis. Global demand cannot be met by the small home market, but a borderless export market can propel economic progress. Another essential source of foreign reserves is exports (Riedel, 1975).

2.1.2. The Theory of New Growth

This approach highlights the importance of internal variables such as innovation, human capital accumulation and knowledge generation as essential drivers of economic progress. In order to join the global market, domestic businesses must overcome numerous obstacles. Johansson (1994) added that because of the impact of spillovers, EPZs may benefit the host economy once this issue is resolved.

2.1.3. Theory of Neoclassicism

According to this theory, production of capitalintensive commodities increased while labor-intensive items decreased as a result of foreign direct investment (FDI) in EPZs. Production was therefore far from being comparative in efficiency. Although EPZs indirectly promote economic smoothness, it is not satisfactory level. (Warr,1987) determined that while EPZs promote economic smoothness, they indirectly diminish a country's economic welfare.

2.2. Literature review on the subject

The stages and modifications in EPZ development processes have occurred over time. When FDI first started to flow in, a small number of industries dominated the market. Production and export volumes both significantly increase at take-off. Accordingly, as zones mature, FDI inflows decline, export growth is gradual and labor skill levels rise. A number of policies have been put up to address each of these (Amirahmadi, 1995; Working, 2007).

(Iwamoto & Nabeshima, 2012) investigated how export diversification and export evasion in the host economy are affected by inward FDI and FDI reserves. They employed the 1980–2007 period and 175 countries using GMM model. They found a strong correlation between export diversification and evasion and a fiveyear lag in inward FDI.

(Mottaleb, 2007) there is an empirical correlation between economic growth and FDI in developing nations and the relationship between the two is first demonstrated by analyzing panel data from 60 low and lower-middle income countries.

According to a study by (Islam, 2018), exportoriented zones (EPZs) have a significant impact on foreign earnings through fostering employment growth, foreign direct investment, and exports. However, the study's other findings indicated that EPZs' net profits were not doing well.

(Mehra, 2013) attempted to use multiple regression to examine the effects of FDI inflows on GDP and employment in India from 1990 to 2017. The analysis discovered a strong and positive correlation between GDP and FDI inflows.

Dependency theories contend that because foreign giants have vast financial resources, better technology, greater market access, sophisticated marketing networks, and superior managerial and interpersonal skills, they may have a detrimental longterm impact on the expansion and development of domestic businesses in a host nation (Markusen, 1997; Nölke, 2023).

(Ozturk, 2012) used quarterly data from 1994 to 2008 to examine the causal link between export, FDI and economic development in four of ten European nations. FDI is a key component in fostering economic growth in those countries, according to their evaluation of the effects of export and FDI on growth in GDP.

However, to the best of our knowledge, few research has been done on how FDI affects Bangladesh's EPZs. The study examines how foreign investors will assist local businesses and the potential influence of FDI inflows on Bangladesh's EPZ using secondary data. Since the majority of studies reflect FDI inflows through 2016 or 2018. Here, I've attempted to illustrate how FDI affects EPZ using data as recent as 2022. Also much research has shown how FDI affects several factors, but it does not demonstrate direction of causation between FDI and EPZs in Bangladesh. I attempted to demonstrate the causal relationship between FDI inflows, Export of EPZs and economic growth (GDP) in the short run.

2.3. Objective of the study

The following are the study's objectives:

- 1. To investigate the possibility of a long-run correlation between foreign & domestic investment and EPZ exports.
- 2. To determine the direction of causation between FDI inflows, EPZ exports and GDP in the short run.

3. METHODOLOGY

3.1. Source and Description of data

This paper relied on secondary data, sourced from the World Development Indicator and Bangladesh Export Processing Zones Authority covering the period of 2011-2022 to carry out the research. In this study, total five variables are used.

Table 1: Variables in details				
Abbreviated variables	Specifics of the variables	Source		
EXPE	Export of EPZs	BEPZA		
FDI	Foreign Direct Investment	WDI		
INVE	Investment of EPZs	BEPZA		
GDP	Gross Domestic Product	WDI		
EMP	Employment in EPZs	BEPZA		

To investigate the possibility of a long-term correlation between Export from EPZs and FDI inflows, EXPE is the dependent variable and others are independent variables. Here FDI is the key explanatory variable and investment of EPZs is used as another crucial explanatory variable because this is important performance metric in EPZs. Three categories are available to investors: type-A: Investment with 100% foreign ownership, Type-B: A joint venture, Type-C: 100% Bangladeshi ownership. This variable is used to determine the effect of domestic investment on EPZ performance. At last, the direction of causality is examined using GDP, FDI inflows and Exports from EPZs. The variables were converted to natural log form in order to get the direct elasticity from each variable's estimated coefficient.

3.2. Methods of data analysis

First, we must ensure data stationarity. If the data is not stationary, there is a chance of spurious result. Unit roots are primarily responsible for non-stationarity. The presence of a unit root implies a non-stationary time series, while its absence indicates a stationary time series (Nkoro & Uko, 2016). We use the Augmented Dickey-Fuller (ADF) test to determine stationarity (Dickey & Fuller, 1981). Then, Vector Autoregression (VAR) lag order selection criterion is used to get the optimal lag for the cointegration test. The next stage is to use the ARDL bound test technique to look for a long-term relationship and the Error Correction Model to look for a short-term dynamics. To determine the causal relationship between FDI inflows, Export of EPZs and GDP, VAR Granger Causality is used. Lastly. Some diagnostic test are used such as Jarque-Bera for normality, Breusch Godfrey LM test for autocorrelation, Breusch Pagan-Godfrey test for heteroscedasticity and Ramsey RESET test and CUSUM & CUSUMQ test for stability of the model.

3.3. Model Specification

We have used the following econometric model to investigate the relationship between dependent and independent variables. The functional frameworks for this study can be expressed as follows: LnEXPE= f (LnFDI + LnINVE + LnGDP + LnEMP) Using natural logarithmic form in econometrics: $Ln(EXPE)_{t=}\beta_0 + \beta_1Ln(FDI) + \beta_2Ln(INVE) + \beta_3Ln(GDP) + \beta_4Ln(EMP) + \varepsilon_t$

ARDL Bound test for cointegration: (Pesaran *et al.*, 2001) invented the Autoregressive Distributed Lag (ARDL) bound test approach. To determine if a long-term relation exists or not, the most well-known cointegration test is (Johamen & Jtiselius, 1990), but to apply this method, all of the variables that are chosen must be stationary at I (1). However, the ARDL bound test overcomes this limitation. For the purpose of export in Bangladesh, ARDL model for EPZs are as follows: $\Delta LnEXPE_t=\beta_0+\sum_{i=0}^{p}\beta_{1i\Delta Ln}EXPE_{t-i}+\sum_{i=0}^{q}\beta_{2i\Delta LnFDIt-i}+\sum_{i=0}^{q}\beta_{3i\Delta LnINVEt-i+}$

 $\sum_{i=0}^{q} \beta_{4i\Delta LnGDPt-i} + \sum_{i=0}^{q} \beta_{5i\Delta LnEMPt-i} + \beta_{6iLnEXPEt-i} + \beta_{7iLnFDIt-1} + \beta_{8iLnINVEt-1} + \beta_{9iLnGDPt-1} + \beta_{10iLnEMPt-1} + \epsilon_{t}$

The equation uses Δ as the first difference operator, p as the dependent variable's lag length, and q as the independent variable's lag length. Whereas coefficient values of β_1 to β_5 represent short-run dynamics, coefficient values of β_6 to β_{10} indicate long run effects and \mathcal{E}_t stands for white noise error that is serially independent, homoscedastic and normally distributed.

Using the conventional error correction method, the short run parameters for this investigation will be determined as follows:

determined as follows: $\Delta Ln EXPE_{t} = \beta_{0} + \sum_{i=0}^{p} \beta_{1i\Delta Ln} EXPE_{t-i} + \sum_{i=0}^{q} \beta_{2i\Delta LnFDI_{t}} + \sum_{i=0}^{q} \beta_{3i\Delta LnINVE_{t-i}} + \sum_{i=0}^{q} \beta_{4i\Delta LnGDPt^{-i}} + \sum_{i=0}^{q} \beta_{5i\Delta LnEMPt^{-i}} + \lambda 1ECTt^{-1} + \varepsilon t$

In this equation, the coefficient of ECT refers the correction in disequilibrium.

4. RESULT ANALYSIS AND DISCUSSION

	Table 2. Result of ADT test						
		At level		At first difference			Remark
Variable	t	5%	p-value	t	5%	p-value	
	statistics	critical value		statistics	critical value		
Ln(EXPE)	-2.377	-1.895	0.024**	-4.380	-3.600	0.004***	I(0)
Ln(FDI)	-2.972	-3.600	0.140	-3.269	-1.943	0.008***	I(1)
Ln(INVE)	-2.187	-3.60	0.49	-2.181	-1.950	0.028**	I(1)
Ln(GDP)	-3.064	-1.895	0.009***	-4.317	-3.600	0.003***	I(0)
Ln(EMP)	-1.783	-1.860	0.056	-2.252	-1.895	0.029**	I(1)

Table 2: Result of ADF test

Source: Authors' estimation

Note: *, **, *** denotes the significance level for 10%, 5%, 1% respectively

The findings show that the variables EXPE and GDP are integrated of order zero, I(0) and the variables FDI, INVE and EMP are integrated of order one I(1).

Thus, the ARDL approach is recommended by our unit root results.

	Table 5: Result of Optimal Lag Length Criteria					
Lag	LL	LR	FPE	AIC	HQIC	SBIC
0	27.3248		0.000743	-4.46496	-4.63093	-4.31367
1	40.7825	26.915	0.000067	-6.95649	-7.15565	-6.77494
2	43.8534	6.1419*	0.000051*	-7.37068*	-7.60304*	-7.15887*

Table 3: Result of Optimal Lag Length Criteria

Source: Authors' estimation **Note**: The Criterions Chosen Lag Order Is Estimated by *

In general, the better the model, the lower the criterion value should be used. From table 3, by considering all the factors 2 is the ideal lag length.

Table 4: Result of F- Bound Test						
	H ₀ : No	H ₀ : No level relations hip				
Test Statistics	Value	Significance	I(0)	I (1)		
F-statistic	70.98	10%	2.45	3.52		
k	4	5%	2.86	4.01		
		2.5%	3.25	4.49		
		1%	3.74	5.06		

Source: Authors' Estimation

Here the computed F-statistic is 70.98 which is greater than the upper bound at the critical values of 1%, 5% and 10% (Pesaran *et al.*, 2001). The chosen

variables' long-run cointegration can be confirmed by comparing the F-statistics with upper and lower bounds, so rejecting the null hypothesis.

Variables	Coefficients	Standard error	t-statistics	p-value
Ln(FDI)	0.15026	0.480989	3.12	0.052*
Ln(INVE)	1.32921	0.910457	14.60	0.001***
Ln(GDP)	0.50049	0.1244726	4.02	0.028**
Ln(EMP)	-0.54334	0.2184782	-2.49	0.089*

Source: Authors' Estimation

It demonstrates that the coefficient of the crucial variable FDI is 0.15 which is statistically significant at 10% significance level. It indicates that ceteris paribus, a 1% increase in inward FDI will result in a 0.15% rise in Export of EPZs. Export is positively and significantly impacted by investment. An increase of 1% in investment in EPZs results in 1.32% faster growth of the Export from the EPZ, when other things remaining

same. Also the coefficient of GDP is positive and significant at 5% significance level. It suggests that ceteris paribus, if economic growth increases by 1%, the export from EPZ increases by 0.5%. However, Employment in EPZs has an adverse impact on Export because of high labor and construction costs, low labor quality, unstable employment and a deficiency of operating modern technology etc.

10	ible 0. Shult-i	un coefficients (11)	om ECNI)	
Variables	Coefficient	Standard Error	t-statistics	p-value
Ln(INVE) D1	0.1406874	0.099761	1.41	0.25
Ln(GDP) D1	-0.0348491	0.007015	-4.97	0.016**
ECT(-1)	-0.1217478	0.0284497	-4.28	0.02**
Constant	0.8300108	0.3196253	2.60	0.08*

Table 6:	Short-run	coefficients	(from	ECM)

Source: Authors' Estimation

Note: (*), (**), (***) indicate significance at 10%,5% and 1% level.

It is evident from the calculation that the lagged error correction term ECT(-1) has a negative significance at the 5% significance level and the ECT coefficient is -0.1217, indicating more than 12% of the disequilibrium returns to the long-term equilibrium within a year, when other things remaining same. According to the results, though the short-term coefficient of Investment in EPZ is not significant but it indicates a positive impact on Export. On the other hand, the coefficient of GDP is significant at 5% level but has no favorable impact on Export in the short run because of supply chain disruptions, change in consumer preferences, exchange rate fluctuations etc.

Table 7: Results of VAR	Granger causality/Wald test	
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a) Dependent variable: LnEXPE				
Independent Variables	Chi-sq	Probability	Decision	
LnFDI	21.08	0.000	Rejected	
LnGDP	7.85	0.019	Rejected	
All	21.54	0.0002	Rejected	

Independent Variables	Chi-sq	Probability	Decision
LnEXPE	13.68	0.001	Rejected
LnGDP	4.55	0.10	Accepted
All	16.09	0.002	Rejected

c) Dependent variable: LnGDP

Independent Variables	Chi-sq	Probability	Decision
LnEXPE	0.637	0.72	Accepted
LnFDI	0.295	0.86	Accepted
All	0.933	0.91	Accepted

Source: Authors' calculation

Here, H₀: Independent variable does not Granger Cause Dependent variable

Here in the first scenario (a), LnFDI and LnGDP can Granger Cause LnEXPE in the short run. In the second scenario (b) the combination of the independent variables can generate LnFDI although LnGDP alone does not granger it. The results in scenario

(c) demonstrate that no single variable-not even the combination of the two-can generate LnGDP in the short term. Therefore, there is unidirectional correlation between LnEXPE and LnGDP & bidirectional relationship between EXPE and FDI. Lastly, a suggestion is made for independence between LnFDI and LnGDP in the short run.

Table 8: Results of Diagnostic Test				
	Name of the test	Value		
	Normality	0.7125		
	Serial Correlation	0.1944		
	Heteroscedasticity	0.9083		

Source: Author's estimation

Here the probability values for each of the several diagnostic tests are greater than 0.05, indicating that the test findings are statistically significant at the 5% level. This indicates that the model in this study is free

from heteroscedasticity, autocorrelation and its residuals have a normal distribution.

To confirm the stability of the model in this study, we employed Ramsey RESET test and CUSUM & CUSUMQ tests.

			v		
Test statistic	Value obtained	Probability>F	Remarks		
F- statistic	1.51	0.2931	Model is stable or correctly specified		
Source: Authors' Estimation					

Source: Authors' Estimation

CUSUM and CUSUMQ tests were used to assess the structural stability of the variables recommended by Pearson (1997). The graphs are displayed below:





The empirical results show that, at a 5% level of significance, both test plots are inside the critical zone. This demonstrates the stability of the parameters throughout the long and short terms.

5. CONCLUSION AND POLICY RECOMMENDATIONS

5.1. Conclusion

According to the above computation, FDI directly boosts EPZ exports in the long run which supports export-led growth theory. But bringing benefits to Bangladesh is difficult since domestic Bangladeshi enterprises encounter numerous obstacles while trying to reach the global market. Thus, I agree with the new growth hypothesis that EPZs may benefit the host economy through spillover effects once this issue is resolved.

The government has already implemented a number of financial and non-financial incentives, such as zero duty rates for 100% export-oriented industries, no entry and exit restrictions, tax breaks for power generation, import duty breaks for export processing industries, tax holiday schemes for investing in priority sectors and low-development areas and fewer bureaucratic hassles.

In addition to these benefits, Bangladesh has a low labor cost structure, making it a popular destination for foreign direct investment (FDI) in the South Asian region since the late 1980s.

5.2. Policy recommendations

Despite having the most attractive FDI policies in the SAARC area and showing signs of a boom in FDI flow across a number of sectors, Bangladesh's overall FDI inflow situation is far from satisfactory level. By promoting industry, raising investment, expanding export volume, and creating jobs, BEPZA is a key player promoting socioeconomic development. But in reluctance to employ rules relating to foreign direct investment causes problems for both international and domestic investors. A number of challenges stand in the way of maximizing EPZ output and export profits including a lack of political stability, a crisis in social security, a lack of infrastructure and a transportation network, rising raw material costs, restricted market, low labor productivity etc. So, FDI and EPZ policymakers must address the following concerns in order to attract more FDI in Bangladesh. This study has led to several recommendations:

- Market liberalization is crucial for attracting FDI in emerging nations, such as Bangladesh.
- Businesses find it challenging to run effectively when there are unclear regulations paired with bureaucrats' discretionary power. For this reason, simple, adaptable and effective policies should be created by policymakers to draw FDI to Bangladesh.
- It is recommended that the BEPZA conduct awareness campaigns to guarantee that investors and other significant stakeholders in the EPZ sector are aware of the connections

between the EPZ programs and national and global development.

- Setting up various employee training services for workers in EPZs is crucial since the manufacturing of goods in these areas must follow to worldwide standards and worker skills can effectively uphold these requirements. The worker must acquire the skills necessary to operate the various machines and technologies utilized in EPZs.
- An advanced infrastructure may draw in international capital and guarantee a profit. In certain situations, modern technologies like as touchless assembly and automatic production allow for very good maintenance of product sensitivity.
- In order to meet the data and information needs of EPZ business operations, the BEPZA should think about rapidly establishing a data collecting unit to gather, maintain and administer an extensive database.

However, we cannot ignore the study's shortcomings, which include the tiny observation and unconfirmable data dependability. I encountered discrepancies in the results from different sources over time. Besides it was difficult to access all the related department to get relevant data. However, this research would be beneficial for Bangladesh and other nations particularly those in ASEAN and South Asia that are classified as developing nations because of the high level of foreign investment, the favorable business environment and the abundance of labor.

Ethical considerations: Not applicable.

Conflict of Interest: The authors declare no conflicts of interest.

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