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## Impact of Cumilla Export Processing Zone on Bangladesh's Export and Foreign Direct Investment: An Econometric Analysis

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### ABSTRACT

An export processing zone is a demarcated region inside a nation that is established to encourage and streamline export-driven industry. Increased export along with improved level of foreign direct investment (FDI) and employment generation are the key determinants of success of Export Processing Zones (EPZs) of a nation. This paper tries to explore the effects of Cumilla Export-Oriented Zone (EPZ) in Bangladesh over the period 2001 to 2022 using secondary data from different sources. This study focuses on the EPZ's employment, investment, and export conditions utilizing bar diagrams, and its percentage contribution to export and foreign direct investment. Furthermore, this paper explores the relationship between the FDI in EPZs and employment of Cumilla EPZ. Auto Regressive Distributed Lag (ARDL) bound test is performed in this analysis. The findings of this paper show that there is significant negative relationship between FDI in EPZs and employment of Cumilla EPZ in the short run. But in the long run, there is significant positive relationship between FDI in EPZs and employment of Cumilla EPZ. This paper recommends promoting diverse investing, implementing advanced technologies, reducing raw material price and energy price volatility.

### 1. Introduction

To stimulate economic growth in a nation, it is imperative to encourage foreign investment. Export processing zones (EPZ) serve as specialized economic areas that facilitate this objective. The BEPZA serves as the official entity of the Bangladeshi government responsible for promoting, attracting, and facilitating foreign investment in the EPZs (Begum et al., n.d.). GENEVA (ILO News) - As global competition for jobs and foreign investment intensifies, Export Processing Zones (EPZs) are proliferating worldwide, growing from just a handful a few decades ago to over 850 today, according to a new report 1 published by the International Labor Office (International Labour Organization, 1998). The ILO report, which was prepared for the meeting, says that the largest numbers of zones are in North America (320) and Asia (225). But the concentration of EPZs is rising in developing regions such as the Caribbean (51), Central America (41), the Middle East (39) and the figures are likely to increase throughout the world. The Philippines, for example, currently has 35 EPZs operating but has approved plans for 83. In Asia, China alone has 124 EPZs, many on the scale of full-sized urban and industrial developments, complete with community infrastructure such as education, transport and social services. Bangladesh, Pakistan and Sri Lanka have extensive EPZ

strategies. In Africa there are 47 EPZs, 14 of which are in Kenya (International Labour Organization, 1998). Ireland's Shannon International Airport successfully implemented an EPZ for the first time in 1956, and this served as inspiration for other nations to follow similar with their own growth plans. The first two developing nations to test the concept of EPZs were India in 1965 and Puerto Rico in 1962 (Wong & Chu, 1984). The first EPZ in Bangladesh, known as the Chittagong EPZ (now Chattogram EPZ), was established in 1983. Moreover Cumilla Export Processing Zone was established in 2000 (Bangladesh Export Processing Zones Authority, n.d.). Cumilla EPZ is located in the airport area in Cumilla District of Bangladesh. It's situated in the southeastern part of the country. It's 167 kms from Chittagong Sea Port and 97 kms from Dhaka City Centre (Bangladesh Export Processing Zones Authority, n.d.). Bangladesh's government has implemented a 'Open Door Policy' to entice international investment, with the aim of expediting the nation's economic progress, namely through industrialization. The government's official body responsible for encouraging, enticing, and facilitating foreign investment in the EPZs is the BEPZA. In order to preserve cordial labor-management & industrial relations in EPZs, BEPZA, as the responsible Authority,

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also conducts inspection & supervision of the businesses' compliances with regard to social & environmental concerns, safety & security at work, and so forth. An EPZ's main goal is to create designated regions with welcoming investment environments free of onerous regulations for prospective investors. The inception of EPZ in Bangladesh was in 1983 with the formation of the inaugural EPZ in Chittagong. Bangladesh presently operates eight export processing zones, located at Chittagong, Dhaka, Narayanganj, Nilphamari, Cumilla, Pabna, and Bagerhat. In addition, a decision has been made to construct three additional Export Processing Zones (EPZs) in Rangpur, Jessore, and Patuakhali (Bangladesh Export Processing Zones Authority, n.d.). According to annual report 2021-22 despite the global recession, BEPZA recorded a remarkable increase in investment by 20.26%, export earnings by 30.41% and employment generation by 36.51% compared to the same in previous year (Bangladesh Export Processing Zones Authority, 2022). Furthermore, according to Cumilla EPZ 2022-23 data the year wise investment is 563.73 US Million \$, the year wise number of employment is 50086, the year wise export is 5554.03 US Million \$ (Bangladesh Export Processing Zones Authority, n.d.).

Understanding the economic role of the Cumilla Export Processing Zone (EPZ) in Bangladesh serves as the rationale for the study presented in this paper. The study looks at how export performance, employment creation, and foreign direct investment (FDI) all contribute to economic growth in EPZs. The research is to assess the Cumilla EPZ's contribution to the national economy and investigate the dynamic link between FDI in EPZs and employment within the Cumilla EPZ zone by concentrating on the region between 2001 and 2022.

However the specific objectives include:

- To analyze the investment and export performance and employment situation of Cumilla EPZ.
- To identify Cumilla EPZ's contribution to national export and FDI.
- To investigate if there's any relationship between FDI in EPZs and employment of Cumilla EPZ in Bangladesh.

### 1.1. The hypotheses of the study

Null Hypothesis (H0): FDI in EPZs has no effect on employment creation in Cumilla EPZ.

Alternative Hypothesis (H1): FDI in EPZs has effect on employment creation in Cumilla EPZ.

The hypothesis proposed in the study appears to have two aspects. Employment in Cumilla EPZ and FDI in EPZs have a significant inverse connection in the short term. Employment in Cumilla EPZ and FDI in EPZs have a significant positive association over the long term.

## 2. Literature Review

A few noteworthy works that are relevant to this study on the direction of literature are examined in this part.

Aggarwal (2005), conducts a comparative analysis approach that focuses on the performance of the EPZ

in Bangladesh, Sri Lanka, and India, three South Asian nations. The results indicate that in Bangladesh and Sri Lanka, EPZ policies, governance standards, and incentive programs are unambiguously and steadfastly pro-business. In contrast, the Indian strategy on EPZs was lacking in vision. Moreover, India seems to have excelled in the 1990s in terms of productive effectiveness. However, Sri Lanka outperformed India from 2000 to 2003. Bangladesh's performance was lower.

Shahin Miah (2013), claims that the purpose of this descriptive study is to examine Bangladesh's Export Processing Zones (EPZs) and export diversification. Businesses' average export performance for the 2009–2010 fiscal year was 1.84 times more than their actual investment. As of June 2011, there were 497 industries in EPZs, accounting for a record total of US\$ 2117.69 million in investment, US\$ 25434.89 million in exports, and US\$ 308205 in employment. The productivity performance of EPZ workers is 3.5 times higher than that of DTA personnel.

According to Engman et al. (2007), providing an overview of the evolution of EPZ policies, aims, and incentives, as well as case studies from China, India, and Russia. It also examines the economic costs and advantages of EPZs, notably their consequences for trade and employment. According to the research, a government should perform a comprehensive cost/benefit analysis and set reasonable expectations when creating an EPZ policy. Benefits are contingent upon private investment, which is erratic and dependent on outside variables. Whenever feasible, governments should reduce up-front expenses. Labor laws and regulations that are loosened or exempted have historically had negative effects since they lead to disparate standards across a nation, which can hurt particular worker groups and cause economic distortions. Governments may be forced to behave differently if MFN tariff decreases result from the interaction between EPZs and regional trade agreements.

According to Kusago (2014), the goal of EPZs, a relatively recent phenomena, is to boost foreign profits, transfer technology, and generate jobs in light manufacturing. EPZs offer a cost-effective means of absorbing excess labor for nations just beginning their industrialization process, but as these nations expand economically and industrially, their impacts can diminish. The fact that Taiwan (China) and Korea are no longer as interested in the development of EPZs suggests that the establishment or growth of an EPZ would rely on the economic status of the host nation.

According to Majumder et al. (2022), the objective of this study is to examine the impact of foreign direct investment (FDI) on export processing zones (EPZs) in Bangladesh by utilizing secondary data spanning from 1997 to 2018. The study employed the Generalized Method of Moments (GMM) model to analyze export and utilized the Auto Regressive Distributed Lag (ARDL) bound test approach to examine employment generation. The GMM estimation reveals a positive correlation between

FDI and GDP growth in promoting EPZ export. The ARDL findings indicate a favorable correlation between foreign direct investment (FDI) inflows and employment in export processing zones (EPZs) in both the short and long term. Similarly the effects of inbound FDI and FDI reserves on export diversification and export evasion in the host economy were studied by (Iwamoto & Nabeshima, 2012). The Generalized Method of Moments was utilized. (GMM) model to 175 nations for the years 1980–2007. They found that export diversification and evasion are positively correlated with five years of lag in inward FDI. Reserve has a favorable impact on export evasion.

According to Islam (2018) , the study explores the contribution of EPZs in Bangladesh's economic development based on secondary data. The study found that FDI inflows in Bangladesh reached \$1119.88 million in 2011-2012, with BEPZA contributing 15.50 percent. The highest contribution was 27.44 percent in 2013-2014. According to (Blanco de Armas & Sadni Jallab, n.d.) this article examines the significance and influence of Export Processing Zones (EPZs) in global trade, specifically focusing on their ability to generate foreign exchange revenues, attract foreign direct investment (FDI), facilitate technology transfer, and stimulate employment in local and national economies. Mexico, a nation that has achieved a high level of economic development, is seen as a suitable subject for evaluating the degree to which predictions of economic theory are actualized. The maquila sector has effectively mitigated unemployment and mitigated the economic crisis in 1994-95.

According to Online & Jayanthakumaran (2002) , the literature discussing Export Processing Zones (EPZs) in six South Asian countries examines descriptive, theoretical, and benefit-cost analysis aspects. This paper reviews existing literature on the effectiveness of EPZs, particularly those employing a benefit-cost analysis. The review indicates that as industrial development advances, the difference between the market cost and opportunity

cost of labor decreases, potentially leading to diminished interest in EPZs.

According to (Aggarwal et al., n.d.), Bangladesh, India, and Sri Lanka have a long tradition of operating export processing zones (EPZs), which have been successful in attracting foreign direct investment and creating new economic activities and employment opportunities. However, the diversity in operating conditions and export performance is more pronounced across different zones within a single country than across country-averages. This is mainly due to the importance of good access to transport infrastructure, and zones established to help develop backward regions are more likely to underperform than those in prime industrial locations. According to Mehrara et al. (2013) , this study investigates the causality among economic growth, Foreign Direct Investment (FDI), and exports in developing countries. This study employs contemporary econometric methodologies to examine the evolving causal connections between GDP, exports, and FDI inflows in 57 developing nations from 1980 to 2007. The findings demonstrate that in the state of long-term equilibrium, there is a causal relationship between exports and FDI inflows on GDP, and likewise, exports and GDP have a similar effect on FDI inflows.

## 2.1. Research Gap

The impact of economic stimulants on economic growth may be amplified by other variables. These elements include accountability, strong governance, political stability, and institutional excellence. Nevertheless, none of these factors were taken into account in the study. These factors should be taken into account in future research. Future research might also look at the threshold level of these growth variables that would cause Bangladesh's economy to expand.

## 3. Materials and Methods

### 3.1. Data Description and Sources

**Table 1.** Data and Variables in details

Variables in Abbreviations	Details of the Variables	Sources	Time Period
EMP	Employment in Cumilla EPZ	BEPZA	2001-2022
EFDI	FDI in EPZs( million USD)	BB	2001-2022
DINV	Total Domestic investment % of GDP	Bangladesh Economic Review	2001-2022
LBR	Labor force total	WDI	2001-2022
INFC	Inflation % consumer price	WDI	2001-2022

*Source: Author's creation*

To examine the objectives of this study, secondary data are used. Data related to investment, employment, export of Cumilla EPZ are from the Bangladesh Export Processing Zones Authority. Table 1 shows dataset comprises yearly time series data over the period 2001-2022. Data related to FDI in EPZs, total domestic investment are from the databases of Bangladesh Bank and Bangladesh

Economic Review. Furthermore data obtained such as total labor force and inflation are from the database of World Bank's World Development Indicator.

### 3.2. Methodology

In order to analyze the first objective of investment, export performance and employment situations of

Cumilla EPZ, we show bar graphs of investment, export and employment scenarios of Cumilla EPZ. For the purpose of identifying second objective, we show Cumilla EPZ's contribution to national export and investment through percentage in tables. Finally to obtain third objective, we regress employment of Cumilla EPZ on FDI in EPZs, investment, total labor force and inflation. The Auto Regressive Distributed Lag (ARDL) strategy to cointegration, as proposed by Pesaran et al. (2001), is utilized for this purpose. The employment of Cumilla EPZ is the dependent variable in the model, whereas the major independent variable is the foreign direct investment in EPZs. Several control factors can be employed to mitigate the issues caused by omitted variables.

**3.3. Model Specification**

Our empirical study aims to ascertain the influence of Foreign Direct Investment (FDI) on the employment levels within Cumilla Export Processing Zone (EPZ). Additionally, we seek to establish whether a relationship exists between FDI and employment. The Autoregressive Distributed Lag (ARDL) bound test approach was proposed by Pesaran et al. (2001). If all the chosen variables are stationary at a mixed order, either I(0) or I(1), we can proceed with the Autoregressive Distributed Lag (ARDL) analysis. The cointegration test developed by Johansen (1990) and Johansen and Juselius (1990) is widely recognized as the most renowned method for determining the presence of a long-term relationship. This methodology necessitates that all chosen variables exhibit stationarity at I (1). However, the ARDL bound test overcomes this limitation.

**3.4. Empirical Framework**

To examine the relationship between FDI in EPZs and employment of Cumilla EPZ in the short and long term, we have used ARDL cointegration bound test method. We can define the model as:

$$LN EMP_t = \beta_0 + \beta_1 LNEFDI_t + \beta_2 LNDINV_t + \beta_3 LNLBR_t + \beta_4 LNINFC_t + \epsilon_t \dots\dots\dots (1)$$

Here,

EMP = Employment in Cumilla EPZ

EFDI = FDI in EPZ (million USD)

DINV = Total domestic investment % of GDP

LBR = Total labor force

INFC = Inflation % consumer price

$\beta_0$  = Intercept term

$\beta_1, \beta_2, \beta_3, \beta_4$  = Partial regression coefficients

$\epsilon$  = Stochastic error term

t = Time period from 2001-2022

**3.5. ARDL Bound Test for Cointegration**

Autoregressive Distributed Lag (ARDL) model is commonly used in a single-equation framework to inspect dynamic interaction with time series data. We propose the utilization of the Autoregressive Distributed Lag (ARDL) model to analyze the impact of FDI in EPZs on employment generation of Cumilla EPZ in Bangladesh.

$$\Delta LN(EMP_t) = \beta_1 + \beta_2 \sum_{i=0}^m \Delta LN(EFDI_{t-i}) + \beta_3 \sum_{i=0}^m \Delta LN(DINV_{t-i}) + \beta_4 \sum_{i=0}^m \Delta LN(LBR_{t-i}) + \beta_5 \sum_{i=0}^m \Delta LN(INFC_{t-i}) + \beta_6 LN(EFDI) + \beta_7 LN(DINV_{t-1}) + \beta_8 LN(LBR_{t-1}) + \beta_9 LN(INFC_{t-1}) + \epsilon_t \dots\dots (2)$$

In equation (2),  $\Delta$  represents the first difference operator, m denotes the number of optimal lags,  $\beta_2$  to  $\beta_5$  correspond to short-run parameters, and  $\beta_6$  to  $\beta_9$  represent long-run parameters.  $\epsilon_t$  represents the white noise error term.

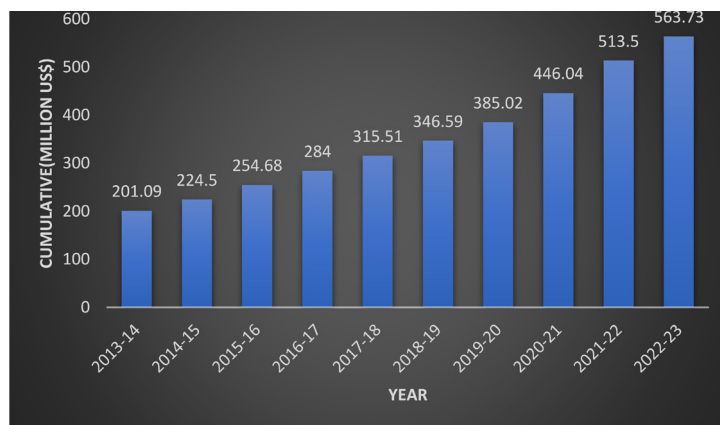
We conducted a bound test using F-statistics to determine the long-term relationship. The null hypothesis states that there is no cointegration among the variables. If the F-statistic exceeds the upper bound, it indicates the presence of long-run cointegration among variables, and hence we reject the null hypothesis. Following is the Error Correction Model:

$$\Delta LN(EMP_t) = \beta_1 + \beta_2 \sum_{i=0}^m \Delta LN(EFDI_{t-i}) + \beta_3 \sum_{i=0}^m \Delta LN(DINV_{t-i}) + \beta_4 \sum_{i=0}^m \Delta LN(LBR_{t-i}) + \beta_5 \sum_{i=0}^m \Delta LN(INFC_{t-i}) + \lambda ECT_{t-1} + \epsilon_t \dots\dots\dots (3)$$

In equation (3),  $\lambda$  indicates the speed of adjustment, which is the rate at which the long-run disequilibrium from the previous year is adjusted in the current year, following a short-run shock. The ECT must possess a negative sign and the p value must be below 5% in order to be considered statistically significant.

**4. Results and Discussion**

**4.1. Present Scenarios of Cumilla EPZ**

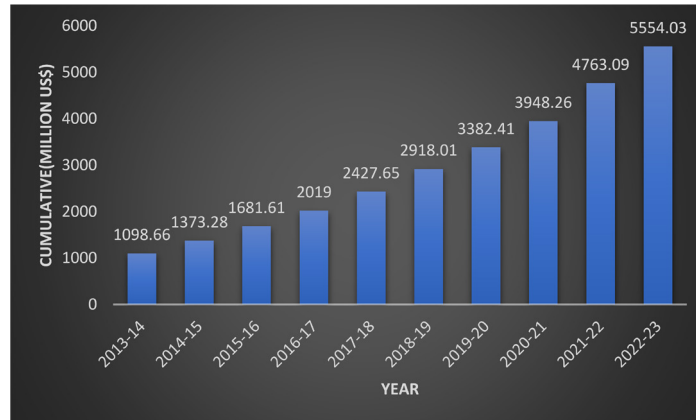


**Figure 1.** Investment scenario of Cumilla EPZ

Source: BEPZA (2022-23)

The figure 1 displays the Fiscal Year on the X axis and the amount in US\$ (in millions) on the Y axis. The investment of Cumilla EPZ is concentrated on the blue line. The investment in FY 2013-14 amounted to 201.09 million US dollars. The investment amounted to \$224.50 million

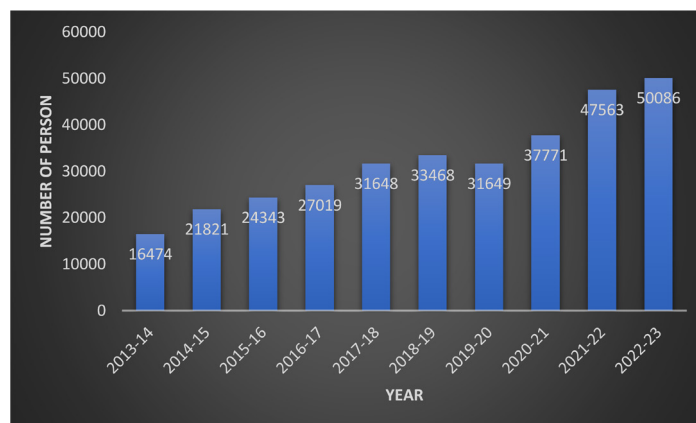
during the fiscal year 2014-2015. Between FY 2013-14 and FY 2022-23, there was a consistent upward trend in the value, which rose from US \$ 201.09 million to 563.73 million US\$. Figure 01 illustrates a favorable increase in the actual investment made in the EPZ.



**Figure 2.** Year Wise Export of Cumilla EPZ  
 Source: BEPZA (2022-23)

The figure 2 displays the Fiscal Year on the X axis and the amount in US\$ millions on the Y axis. The blue line prioritizes the export of goods from Cumilla EPZ. From fiscal year 2013-14 to fiscal year 2022-23, the firms in this EPZ exported items totaling US\$ 5554.03 million. The contribution of Export Processing Zones (EPZs) to the total national export volume is growing each year, in parallel with the increase in exports. The export of

Cumilla EPZ experienced consistent growth from 2013-14 to 2022-23. The amount was \$1,098.66 million in the fiscal year 2013-14, and it has experienced a huge increase to \$5,554.03 million in the fiscal year 2022-23. This is a favorable circumstance for the economy of Bangladesh. The year wise employment of Cumilla EPZ is as follows from 2013-14 to 2022-23.



**Figure 3.** Year Wise Employment of Cumilla EPZ  
 Source: BEPZA (2022-23)

The figure 3 displays the Fiscal Year on the X axis and the Number of Employment on the Y axis. The blue line emphasizes the employment situation in Cumilla EPZ. A total of 50,086 Bangladeshi citizens were directly employed during the past 10 fiscal years. The number

rose from 16,474 in the fiscal year 2013-14 to 50,086 in the fiscal year 2022-23.

**4.2. Cumilla EPZ’s Contribution in National Export and FDI**

**Table 2.** Cumilla EPZ’s contribution to National Export

Year	Total Export of Bangladesh (US\$ million)	Total Export of Cumilla EPZ (US\$ million)	Cumilla EPZ’s contribution (%)
2013-14	29304	1098.66	3.75
2014-15	32830	1373.28	4.18

2015-16	33820	1681.61	4.97
2016-17	36924	2019.00	5.47
2017-18	37658	2427.65	6.45
2018-19	40734	2918.01	7.16
2019-20	45993	3382.41	7.35
2020-21	39045	3948.26	10.11
2021-22	44835	4763.09	10.62
2022-23	59284	5554.03	9.37

Source: WDI and BEPZA (2022-2023)

The table 2 helps assess the economic impact and significance of goods and services produced within the EPZ in relation to the overall export output of a country. A higher percentage suggests a greater reliance on the EPZ for exports, highlighting its importance in the economy. From the table 2 we can see, in 2013-14 the contribution

of Cumilla EPZ in relation to total export of Bangladesh was 3.75%. In 2014-15 the contribution was 4.18%. Thus the percentage has increased from 4.18% to 4.97% and so on. In 2022-23, Cumilla EPZ contributed 9.37% to total exports. Finally it can be said that this is a positive aspect for the economy of Bangladesh.

**Table 3.** Cumilla EPZ's contribution to National FDI

Year	FDI in flows (net) in Bangladesh(US\$ million)	FDI in flows(net) in Cumilla EPZ (US\$ million)	Cumilla EPZ's contribution in (%)
2013-14	1480.34	201.09	13.58
2014-15	1833.87	224.50	12.24
2015-16	2003.53	254.68	12.71
2016-17	2454.81	284.00	11.57
2017-18	2580.44	315.51	12.23
2018-19	3888.99	346.59	8.91
2019-20	2370.45	385.02	16.24
2020-21	2507.31	446.04	17.79
2021-22	3439.63	513.50	14.93
2022-23	3249.68	563.73	17.35

Source: Bangladesh Bank and BEPZA (2022-23)

The percentage contribution of a Cumilla EPZ's investment to the national Foreign Direct Investment (FDI) shows the proportion of the total foreign direct investment in a country that is specifically attributed to activities within the EPZ. A higher percentage contribution suggests that the EPZ is successful in attracting foreign direct investment. According to Table 3 the contribution of Cumilla EPZ's to FDI was 13.58% in 2013-14. This contribution gradually increased to 17.35% in 2022-23. In conclusion, it can be stated that

this represents a favorable progress for Bangladesh's economy.

#### 4.3. Unit Root Test

A statistical technic called a unit root analysis is used to assess if a time series data seems to have a unit root, where the mean and variance of the data is not constant over time, indicating that the series is non stationary. The unit roots in the study are assessed using the Augmented Dicky Fuller (ADF) tests.

**Table 4.** Results of Augmented Dicky Fuller Test

Variables	At level			At first difference			Order of integration
	Test statistics	5% critical value	P value	Test statistics	5% critical value	P value	
LNEMP	-2.382	-1.740	0.0146				I(0)
LNEFDI	-0.870	-1.740	0.1982	-3.223	-1.746	0.0027	I(1)
LNDINV	-1.407	-1.740	0.0887	-4.759	-1.746	0.0001	I(1)
LNLBR	0.775	-1.740	0.7756	-2.553	-1.746	0.0106	I(1)
LNINFC	-4.126	-1.740	0.0004				I(0)

Source: Author's calculation

According to Table 4, we can see LNEMP and LNINFC are stationary at level. But LNEFDI, LNDINV, LNLBR are not stationary at level. If a variable is non stationary at level, ARDL allows to test stationarity after being first differenced. So we apply the first difference for the variables LNEFDI, LNDINV, LNLBR, and then the test result is stationary. This applies that the variable LNEFDI, LNDINV, LNLBR are integrated of order one, I (1). We can conclude that all variables are either integrated of

order 0, I (0) or integrated of order one, I (1).

**4.4. Optimal Lag Selection**

Once the stationary criterion is satisfied, the second step for estimating the relationship between the regressand and regressors is the optimal lag order selection. In ARDL, the Akaike information criterion (AIC) is used to select the appropriate lag to obtain the objectives.

**Table 5.** Lag Selection Criterion

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	65.2513				1.7e-09	-6.02513	-5.97654	-5.7762
1	144.793	159.08	25	0.000	7.8e-12*	-11.4793*	-11.1877*	-9.98566*
2	169.679	49.773*	25	0.000	1.4e-11	-11.4679	-10.9334	-8.72964

Source: Author's calculation

The result shown in Table 5 determines the optimal lag. The lag order selected for our analysis is lag 1, based on the AIC criterion. The lag chosen for the model is ARDL (1 1 1 0 1). That means we use the lag lengths for the variables of employment of Cumilla EPZ, FDI in EPZ, domestic investment, total labor force and inflation are 1,

1, 1, 0, 1 accordingly in our study.

**4.5. ARDL Bound Test for Cointegration**

Now we can perform the bound F-test for cointegration following Pesaran et al. (2001). We can get critical values of F-statistic and t-statistic from table 4.5 and table 4.6.

**Table 6.** F- Bound Test for Cointegration

F-statistics = 15.812		
Number of independent variables, K = 4		
Critical values	Lower bound, I(0)	Upper bound, I(1)
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Source: Author's calculation

H0: No levels of relationship  
The model's F-test is determined by the ARDL bound F-test, and it is 15.812. At the 1% level of significance, the estimated F-statistic value of our model has exceeded

the upper bound. So we may reject the null hypothesis that indicates no co-integration among variables, and the result demonstrate a long term connection between our variables.

**Table 7.** Long Run Relationship Estimation

Variables	Coefficients	Std. error	t-statistic	p-value
LNEFDI	0.4590292	0.1467073	3.13	0.009***
LNDINV	-1.28014	2.380602	-0.54	0.601
LNLBR	6.398307	1.430918	4.47	0.0008***
LNINFC	0.5186646	0.1911178	2.71	0.0188**
R-square = 0.9023				
Adjusted R-square = 0.8372				

Source: Author's calculation

Note: (\*\*\*), (\*\*), (\*) indicates level of significance at 1%, 5% and 10%.

According to Table 7 the variables FDI in EPZ and total labor force are statistically significant at 1% and inflation is at 5%. This implies that FDI in EPZ, total labor force and inflation have a positive effect on employment of

Cumilla EPZ whereas domestic investment has a negative effect. The results illustrate that, in the long term, a 1% increase in FDI in EPZ causes employment of Cumilla EPZ to increase by about 0.46%. Also a 1% increase in the total labor force leads to an increase in the employment of Cumilla EPZ by 6.40% in the long run. Furthermore,

a 1% increase in inflation leads to an increase in the employment of Cumilla EPZ by 0.52% in the long run.

Lastly, when domestic investment increases by 1%, the employment of Cumilla EPZ decreases by 1.28%.

**Table 8.** Short Run Estimation

Variables	Coefficients	Std. error	t-statistic	p-value
ECT (-1)	-0.8082784	0.1520132	-5.32	0.000***
LNEFDI(-1)	-0.2804669	0.0999184	-2.81	0.016**
LNDINV(-1)	3.346585	1.712013	1.95	0.074*
LNINFC(-1)	-0.3152506	0.1760297	-1.79	0.099*
Cons.	-84.2229	22.49455	-3.74	0.003***

R-square = 0.9023  
Adjusted R-square = 0.8372

Source: Author's calculation

Note: (\*\*\*), (\*\*), (\*) indicates level of significance at 1%, 5% and 10%.

The short-run analysis results reveal that the ECM term in our study is significantly negative and the coefficient of ECM is -0.8082784, which indicates more robust faster rate of adjustment between the short-run and long-run,

about 80.8%. From the above table, it is clear that in the short run, one year lag of FDI in EPZ and inflation rate have significant negative impact on the employment of Cumilla EPZ whereas domestic investment has a significant positive impact on the employment of Cumilla EPZ.

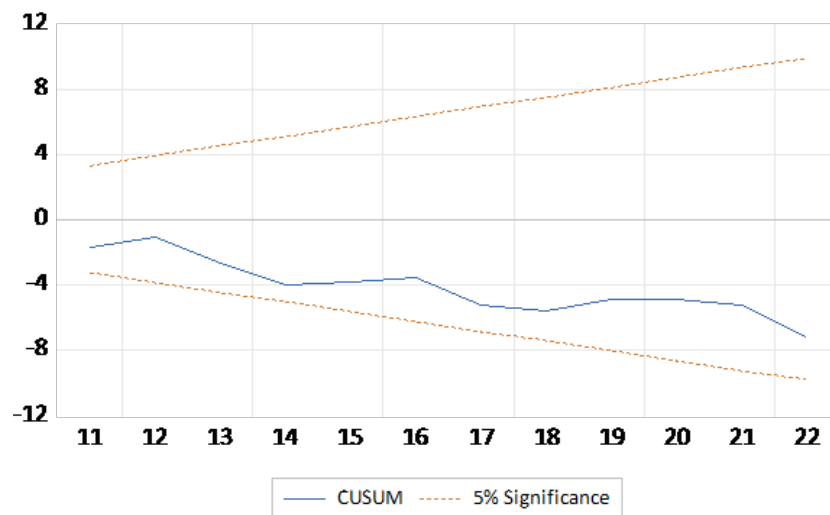
**Table 9.** Diagnostic Test results of ARDL model

Test Type	Probability value
Jarque-Bera test	0.512369
Breush-Godfrey serial correlation test	0.5720
Heteroskedasticity test	0.1026

Source: Computed by author

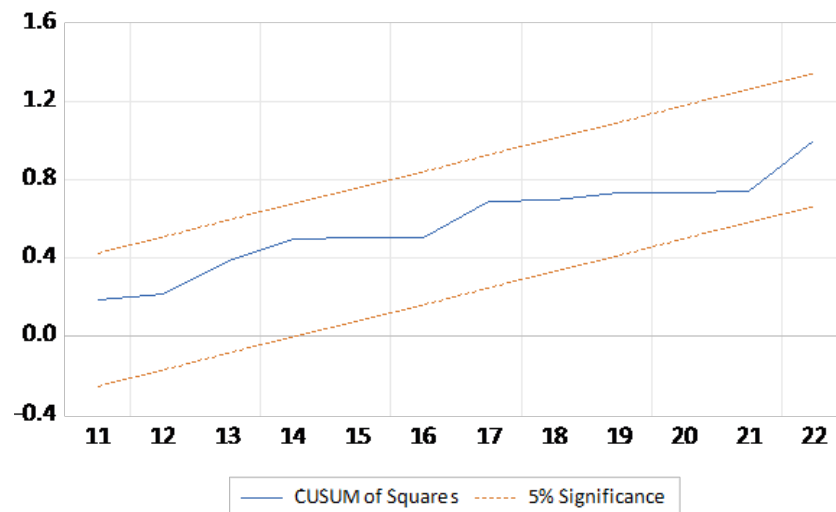
Multiple tests are used to diagnose the ARDL bound test model. At the 5% significance level, the test findings shown in Table 9 verify that there is no serial correlation

or heteroskedasticity issue. The residuals are normally distributed.



**Figure 4.** CUSUM Test

Source: Author's calculation



**Figure 5.** CUSUMSQ Test

Source: Author's calculation

The CUSUM and CUSUMSQ tests are used to check the model's stability. The figures presented in 4 and 5 demonstrate that the estimated coefficient of the model remains consistent. This is indicated by the blue line falling within the range of the red lines, which is statistically significant at a 5% level of significance. This observation is true for both figures.

#### 4.6. General Discussions

This study's primary objective is to investigate how the Cumilla Export Processing Zone affects Bangladesh's economy. First, we look at the existing export, investment, and employment conditions in the Cumilla EPZ. Second, we calculate Cumilla EPZ's export and foreign direct investment contribution as a percentage. Finally, we use the ARDL Bound Test to investigate the association between employment in Cumilla EPZ and FDI in EPZ. With an elasticity of 0.46%, 6.40%, and 0.52%, respectively, the foreign direct investment in EPZs, total labor force and inflation rate all significantly boost the creation of jobs in Cumilla EPZ over the long term.

#### 4.7. Social and Practical Implications

With employment rising from 16,474 in 2013–14 to 50086 in 2022–23, the Cumilla EPZ has made a substantial contribution to job creation in Bangladesh, implying improved standards of living for a significant portion of the population. Employees in the EPZ gain training and exposure to cutting-edge technologies, which increases their potential for employment and output in both domestic and international markets.

With exports making up 9.37% of Bangladesh's total in 2022–2023, Cumilla EPZ's steady increase in investment and export contributions highlights its significance as an engine of economic growth. In 2022–2023, Cumilla EPZ's proportion of national FDI rose to 17.35%, demonstrating its ability to draw in foreign capital and promote industrial diversification. Initiatives like to Cumilla EPZ might serve as models for similar projects

in other areas, promoting inclusive growth.

#### 4.8. Policy Recommendations

The following recommendations are based on the study:

- The government should prioritize the strategic development of the EPZs. Prioritization should be given to BEPZA's adequate gas and power supply in particular.
- Another suggestion derived from this study is to promote diverse investing.
- Political stability is crucial to the long-term viability and success of any EPZ.
- Provide diverse training resources for workers in EPZs to uphold global standards and enhance their expertise.
- Acquire proficiency in operating various equipment and technologies employed in Cumilla Export Processing Zone.
- The significance of infrastructural development in EPZs lies in the attraction it holds for foreign investors, who seek to invest in well-protected and reliable working facilities. An advanced infrastructure has the potential to allure foreign investors and guarantee their profitability. Aside from constructing roadways and expressways, it is crucial that airports can be situated in close proximity to Export Processing Zone of Cumilla.
- Implement advanced technologies such as automatic production and touch-less assembly to maintain product sensitivity.
- Maximizing output and export revenues in EPZs can be achieved by reducing the volatility of raw material prices and energy prices.
- Procedures and other administrative support services should be improved and made more efficient. In addition, some authority should be assigned to allow for quicker response.

#### 5. Conclusion

This analysis tries to explore the effects of Cumilla Export-Oriented Zone (EPZ) in Bangladesh over the period 2001 to 2022 using secondary data from different

sources. The study focuses on the EPZ's employment, investment, and export conditions, and its contribution to export and foreign direct investment. We perform an ARDL Bound Cointegration test to investigate the relationship between FDI in EPZs and employment in Cumilla EPZ. The analysis shows that FDI in EPZs has a significant positive impact on employment over the long-run and has a significant negative impact on employment over the short-run. Furthermore, due to the high level of foreign investment, the hospitable business environment, and the abundance of labor, this research would be particularly useful for emerging nations in Asia and South Asia. However, numerous obstacles exist that make it difficult to maximize EPZ output and export revenues. These include the absence of political unpredictability, legal restrictions, a social security problem, a lack of infrastructure and a transportation network, rising raw material costs, and volatility in energy prices. Therefore, the study recommends the government to prioritize strategic development of EPZs, particularly in the area of adequate gas and power supply. It also suggests promoting diverse investing, political stability, and implementing advanced technologies like automatic production and touch-less assembly. Providing diverse training resources for workers in EPZs to uphold global standards and enhance their expertise. Maximizing output and export revenues in EPZs can be achieved by reducing the volatility of raw material prices and energy prices.

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