Enclave Industrialization Redux? Export Processing Zones in Bangladesh

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Introduction

▶ EPZs/SEZs/FTZs are different names across countries

▶ Are economic enclaves promoted by a set of policy instruments that are not generally applicable to the rest of the country (Hamada 1974; Hamilton and Svenson, 1982; Miyagiwa, 1986; Rodriguez, 1986)

▶ Brings together multiple companies in one geographic and fenced location to ease transaction costs and generate both vertical and horizontal agglomeration (Ge 1999; Hamada 1974)
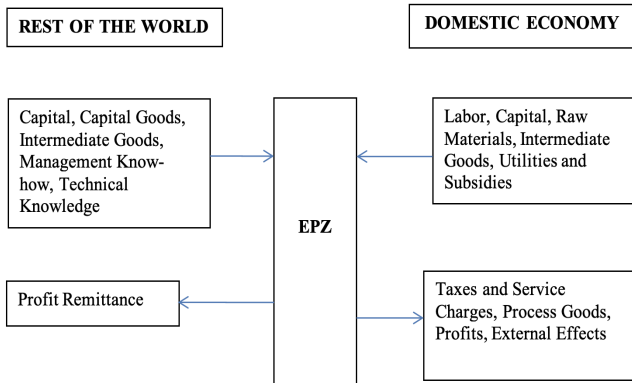
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Bangladesh Context

- ▶ Inherited an import-substituting industrial regime from erstwhile Pakistan and introduced public sector-led industrialization after independence
- ▶ Was besieged with restrictive fiscal, trade, exchange rate, and labor policies that were favorable to the import substitution industrialization strategy
- ▶ Attempts to promote export-oriented industry within such a regime required countervailing measures such as duty drawbacks, cash compensation, or import replenishment licenses to offset the effects of these disincentives
- ▶ ⇒ EPZs were established under the BEPZA Act of 1980

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Research Questions

- ▶ What are the contributions of the EPZs to the Bangladesh economy?

- ▶ The paper explores:
    - ▶ Welfare impacts (zone specific and aggregate)
    - ▶ Drivers of performance
    - ▶ Convergence of performance
    - ▶ Spillover effects

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Cost Benefit Analysis: Enclave Model

Enclave Model of EPZ

REST OF THE WORLD		DOMESTIC ECONOMY

Capital, Capital Goods, Intermediate Goods, Management Know-how, Technical Knowledge → **EPZ** ← Labor, Capital, Raw Materials, Intermediate Goods, Utilities and Subsidies

Profit Remittance ← **EPZ** ← Taxes and Service Charges, Process Goods, Profits, External Effects

Source: Adapted from Warr (1989)

Cost Benefit Analysis: Results

Welfare Impacts of the EPZs (Project Life 30 years)

Item	AEPZ	CEPZ	COEPZ	DEPZ	IEPZ	KEPZ	MEPZ	UEPZ	ALL
Local Labor Earnings (million 2015 US $)	**375.94**	**372.58**	**34.63**	**293.18**	**18.74**	**80.04**	**4.42**	**30.29**	**1209.81**
Charges for Utilities, Services, and Infrastructures (million 2015 US $)	48.76	11.21	3.88	13.78	10.15	40.40	5.72	49.88	183.79
Rental of Plots and Buildings (million 2015 US $)	22.34	19.24	9.29	7.13	6.24	14.50	1.35	1.41	81.50
Consumption of Foreign Employees (million 2015 US $)	16.51	205.10	4.16	86.35	1.87	10.91	0.24	2.60	327.73
Domestic Procurement (million 2015 US $)	14.43	11.09	1.90	6.37	1.14	13.30	0.01	0.05	48.28
Return from Equities of B- and C-Category Firms (million 2015 US $)	0.80	1.24	4.92	3.85	1.89	4.29	0.70	0.23	17.92
Total Returns (million 2015 US $)	**478.77**	**620.47**	**58.79**	**410.65**	**40.03**	**163.44**	**12.44**	**84.46**	**1869.04**
Capital and Development Costs (million 2015 US $)	61.49	117.79	8.67	86.84	17.03	12.42	8.89	4.17	317.30
Operations and Maintenance Costs (million 2015 US $)	56.09	14.68	6.19	29.19	14.79	9.16	5.54	3.78	139.42
Total Costs (million 2015 US $)	**117.58**	**132.46**	**14.86**	**116.03**	**31.82**	**21.58**	**14.44**	**7.95**	**456.72**
NPV (million 2015 US $)	**361.19**	**488.01**	**43.93**	**294.62**	**8.21**	**141.85**	**-2.00**	**76.51**	**1412.32**
Benefit-Cost Ratio	**4.07**	**4.68**	**3.96**	**3.54**	**1.26**	**7.57**	**0.86**	**10.63**	**4.09**
Economic Rate of Return (%)	**26.73**	**41.20**	**24.13**	**28.47**	**14.23**	**52.37**	**8.03**	**34.66**	**30.69**

Source: Computed from BEPZA Data, and BIDS Survey, 2015.

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EPZ Performance

▶ The value of export could be one of the indicators of performance of an EPZ

▶ Performance could be explained by factors such as investment, employment, age of the EPZ, physical land size, distance from the nearest city, etc.

▶ Some factors vary both temporally and cross-sectionally, whereas some vary only cross-sectionally

▶ Therefore, we use the Correlated Random Effects Model (CREM) which allows both types of variations

EPZ Performance: CREM

$$Y_{it} = \beta_0 + \beta_1 X_{it} + C_i \beta_2 + \pi \bar{X}_i + \nu_i + \epsilon_{it}$$

▶ Y_{it} = Export from the EPZ

▶ $\pi \bar{X}_i + \nu_i = \mu_i$ is the time-invariant error term

▶ $\bar{X}_i = n_i^{-1} \sum_{t=1}^{n_i} X_{it}$ accounts for correlation between X_{it} and μ_i

▶ β_1 and β_2 are respectively the fixed effect and random effect estimates

▶ X_{it} are investment, employment, and age of the EPZ

▶ C_i are distance from the nearest city, the distance from the capital city, and the distance from the nearest seaport

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EPZ Performance: Estimates

Determinants of performance

Dependent Variable: Log Export	(1) CREM
Log Investment	0.420**
	(0.172)
Log Employment	-0.004
	(0.146)
Log Age	2.262***
	(0.237)
Investment (cross-sectional average)	1.027
	(1.588)
Employment (cross-sectional average)	-0.518
	(1.385)
Age (cross-sectional average)	-1.033
	(3.758)
Log Size	0.168
	(4.434)
Log Distance from Dhaka	-0.360
	(0.533)
Log Distance from Seaport	-0.234
	(0.250)
Constant	-2.718
	(14.935)
Observations	152
Number of EPZs	8
Wald (prob>chi2)	0.000

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

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Convergence

▶ **Convergence:** If an EPZ is a 'worse' performer than the others, does it show tendency to catch up with better performers? If so, to what extent?

▶ Performance indicators: Export value, investment value, employment, and a measure of nightlight within the EPZs.

▶ $\log(\frac{y_{it}}{y_{i,t-1}}) = \alpha_t + \beta \log(y_{i,t-1}) + u_{it}$
  ▶ $E(u_{it}) = 0$ and $Var(u_{it}) = \sigma_{it}^2$
  ▶ $u_{it} \perp \log(y_{i,t-1}), u_{it} \perp (u_{i,t-1}$ and $u_{j,t-1})$ when $j \neq i$

▶ Negative and significant β means that there is convergence, whereas $|\beta| =$ Speed of convergence

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Convergence: Estimates

Convergence of EPZs in terms Export, Investment and Employment

VARIABLES	(1)	(2)	(3)
	Growth rate at time t		
	Export	Investment	Employment
Growth rate at time (t-1)	0.138***	0.151	0.102
	(0.039)	(0.125)	(0.074)
Log Export at time (t-1)	-0.248***	0.014	-0.101
	(0.027)	(0.086)	(0.073)
Log Investment at time (t-1)	0.056	-0.300**	0.182**
	(0.078)	(0.138)	(0.077)
Log Employment at time (t-1)	0.112***	0.061	-0.275***
	(0.035)	(0.116)	(0.096)
Log Age	0.223**	0.256	0.271
	(0.090)	(0.262)	(0.325)
Log Size	-0.280	0.209	0.228
	(0.185)	(0.461)	(0.306)
Log Distance from Capital City	-0.129***	-0.093	0.016
	(0.031)	(0.140)	(0.129)
Log Distance from Nearest Seaport	-0.014	0.046**	0.100**
	(0.018)	(0.022)	(0.040)
Log Plot Tariff	0.241	-0.009	0.883*
	(0.224)	(0.318)	(0.530)
Constant	4.790***	3.375	-2.730***
	(1.396)	(2.702)	(0.852)
Observations	136	136	136
Number of EPZs	8	8	8
Sargan test (Prob > chi2)	0.1937	0.0005	0.7487
Arellano Bond test-Order 1 (Prob > z)	0.0437	0.2014	0.091
Arellano Bond test-Order 2 (Prob > z)	0.4326	0.3499	0.4956

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Regular (non-robust) standard errors were used for the Sargan test.
Source: Authors' estimation

Convergence: Estimates..

Convergence of nigh light luminosity inside EPZ

VARIABLES	(1) Growth rate of luminosity inside EPZ at time t
Growth rate of luminosity inside EPZ at time (t-1)	-0.078
	(0.067)
Log luminosity inside EPZ at time (t-1)	-0.376***
	(0.067)
Log age	-0.013
	(0.020)
Log size	-0.048
	(0.208)
Log distance from Dhaka	0.012
	(0.065)
Log distance from nearest seaport	-0.039
	(0.039)
Log plot tariff	1.162***
	(0.279)
Constant	0.928
	(1.251)
Observations	144
Number of zone_code	8
Sargan test (Prob>Chi2)	0.7397
Arellano Bond test order 1 (Prob>z)	0.0219
Arellano Bond test order 2 (Prob>z)	0.0585

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Spillover Effects of EPZs

1. We do a pre-post situation comparison of economic activities in the neighborhood of the EPZs.
   - ▶ Neighbourhod= Census of enterprises within 1 kilometer radius of the EPZ
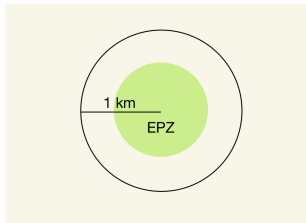
Spillover Effect of the EPZs: Results

Spillover effect: Census Results

	Pre EPZ			Post EPZ (in 2014)			
	Number of enterprises	Employment	Average Turnover (Million Tk.)	Number of enterprises	Employment	Average Turnover (Million Tk.)	Revenue Attributable to EPZ (%)
AEPZ	3	4	1.01	30	52	0.95	67.53
CEPZ	2	1	1.38	303	982	2.36	78.68
COEPZ	8	11	0.67	100	299	2.24	61.50
DEPZ	10	15	1.01	134	356	2.10	74.66
IEPZ	1	1	1.80	51	84	0.87	66.96
KEPZ	56	109	2.41	159	409	2.41	57.52
MEPZ	-	-	-	10	20	0.74	61.50
UEPZ	7	9	1.00	102	211	1.81	69.53
All EPZs	87	150	1.89	889	2413	2.10	70.07

Spillover Effect of the EPZs..

2. We estimate the effect of night-light luminosity inside the EPZ on the night-light luminosity of the ones in the neighborhood (within 1 km radius and 5 km radius) of the EPZ.

   ▶

   $$\log(\frac{y_{it,r}}{y_{i,t-1,r}}) = \alpha_t + \beta \log(\frac{y_{it,0}}{y_{i,t-1,0}}) + \gamma \log(y_{i,t-1,r}) + u_{it}$$

   ▶ $y_{it,r}$ represents a measure of nightlight within r square kilometer radius of EPZ i at time t
   ▶ $y_{it,0}$ is the measure of nightlight at the EPZ (i.e., radius zero) i at time t
   ▶ $\beta > 0$ represents a positive spillover effect of the EPZ on its surrounding areas.
   ▶ We used Arellano–Bover/Blundell–Bond linear dynamic panel-data estimation method

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Spillover Effect of the EPZs: Results..

Spillover effect

VARIABLES	(1) Within 1 KM of the EPZ	(2) Within 5 KM of the EPZ
	Growth rate of Luminosity at time t	
Growth rate of luminosity within 1 km of the EPZ at time (t-1)	-0.094*** (0.028)	----
Growth rate of luminosity within 5 km of the EPZ at time (t-1)	----	-0.135*** (0.028)
Log Luminosity within 1 km of the EPZ at time (t-1)	-0.013 (0.023)	----
Log Luminosity within 5 km of the EPZ at time (t-1)	----	-0.133** (0.068)
Growth rate of luminosity inside EPZ at time t	0.863*** (0.065)	0.767*** (0.069)
Constant	-0.851 (1.294)	-0.201 (0.485)
Observations	144	144
Number of zone_code	8	8
Sargan test (Prob > chi2)	0.9756	0.9083
Arellano Bond test-Order 1 (Prob > z)	0.0787	0.0186
Arellano Bond test-Order 2 (Prob > z)	0.4060	0.3948
Controls	Yes	Yes

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1. Regular (non-robust) standard errors were used for the Sargan test.
Source: Authors' estimation

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Conclusions

▶ Positive results in cost-benefit analyses and the largest benefits accruing to labor ⇒ Investment in the establishment of the EPZs has been worthwhile!

▶ Export performance is driven by an increase in investment!
⇒ Need upskilling of workers!

▶ Exports, investment, and employment indicate convergence between 25% p.a. and 30% p.a. Corroborated by the convergence of nightlight luminosity by 38% p.a.⇒ Catching up at a high speed!

Conclusions..

▶ Growth of linked and ancillary enterprises around EPZs in terms of number, employment, and turnover is remarkable ⇒ Positive spillover effects!

▶ Corroborated by positive correlation of nightlight luminosity inside the EPZs and in the neighborhood: 86% p.a. within 1 km, 77% within 5 km ⇒ Decaying spillover effects!

Conclusions..

- ▶ Marshall-Arrow-Romer externalities because of the preponderance of RMG firms in the zones or Jacobian externalities because of the proximity of heterogeneous firms?

- ▶ Is the future bleak unless the EPZs can enter into the GVC?

- ▶ Should BSCIC, BEPZA and BEZA be separate agencies or under ONE AGENCY?

Thank you for your patience!

Questions?

For further queries: myunus@bids.org.bd, mpabon2@illinois.edu