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The Impact of Special Economic Zone Policy on High Quality Economic Development in Indian Cities: Evidence from a Difference in Differences Approach

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ABSTRACT
This study aims to examine the causal impact of Special Economic Zone policy on high-quality economic development in Indian cities, with particular attention to regional heterogeneity between inland and coastal cities and the mechanisms through which the policy influences development quality. This research employs city-level panel data from 51 large and medium-sized Indian cities during 2013–2021. A Difference-in-Differences model is used to estimate the causal effect of SEZ policy on the High-Quality Economic Development Index. The index is constructed using the CRITIC weighting method across five dimensions: innovation, coordination, green development, openness, and shared prosperity. Robustness is assessed through parallel trend testing, placebo tests, alternative dependent variables, and regional heterogeneity analysis. Stepwise regression, Sobel tests, and Bootstrap tests are applied to examine the mediating roles of trade facilitation and investment liberalization. The findings show that SEZ policy significantly improves high-quality economic development in treated cities. The effect is stronger and statistically significant in inland cities, while the impact in coastal cities is insignificant. The results further reveal that SEZ policy promotes development quality by enhancing trade facilitation and investment liberalization. This study contributes to SEZ and regional development literature by shifting the focus from output growth to multidimensional development quality and by providing causal evidence from Indian city-level data. The findings suggest that policymakers should prioritize inland SEZ development, strengthen trade infrastructure, simplify regulatory procedures, improve investment access, and design region-specific SEZ policies to support balanced and sustainable urban economic transformation.

Keywords: High-Quality Economic Development, Special Economic Zone, Trade Facilitation, Investment Liberalization

INTRODUCTION
Since the adoption of market liberalization reforms beginning in 1991, India has recorded sustained episodes of rapid economic expansion, accompanied by notable improvements in infrastructure and per capita income levels (T. Ma et al., 2023). However, while pursuing economic growth, the country has frequently confronted tensions between growth quantity and growth quality. Associated challenges, such as environmental degradation (Lu et al., 2019), low total factor productivity (Aritenang & Chandramidi, 2020), and pronounced regional disparities (Bandyopadhyay 2020), have become increasingly visible. These issues not only threaten social cohesion but also deepen inter-regional inequalities. As India's economy advances toward a more complex and knowledge-intensive stage, placing unqualified priority on high-speed expansion is neither sustainable nor aligned with the aspirations of its population.

Recognizing these challenges, India's National Development Agenda, articulated through successive Five-Year Plans and the Viksit Bharat 2047 vision, has emphasized the need to shift focus from growth speed toward growth quality (X. Li et al., 2021). This transition in economic strategy reflects substantial changes in both the growth model and the structure of economic development, thereby imposing new requirements on national policy. Consequently, relying solely on GDP expansion as the criterion for development is no longer tenable (Rao & Kumar 2021). In this context, the concept of high-quality economic development (HQED) has emerged as the organizing principle guiding India's economic transformation.

During the period of rapid growth, government policy concentrated heavily on coastal development. The Special Economic Zone (SEZ) policy, introduced through the SEZ Act of 2005 and operationalized by the SEZ Rules of February 2006, enabled coastal cities to accumulate early economic advantages (Hyun & Ravi

2022). As the economic landscape evolved, the form and function of SEZs adapted to new development needs. In 2019, the Special Economic Zones (Amendment) Act expanded the eligibility criteria for establishing units within SEZs, allowing trusts and other government-notified entities to participate, thereby opening the policy to a wider range of economic actors. Following this amendment, a new wave of SEZ notifications was formally issued in 2019, with particular emphasis on inland industrial cities. The SEZ policy, evolving from earlier export processing zone (EPZ) initiatives, was designed to respond to changing conditions in the global economy. Beyond providing tax incentives and free trade platforms, it increasingly emphasized institutional innovation, thus exerting a deeper impact on economic development.

While the early SEZ policy stimulated economic development in coastal regions, it also exacerbated regional disparities, making inland development increasingly urgent. Since 2019, the scope of SEZ implementation has expanded into inland manufacturing and service hubs. However, despite the SEZ policy's crucial role in promoting HQED, existing research remains at an early stage, focused mainly on aggregate productivity and export performance with limited insights into the quality dimensions of development and into the differential experiences of inland versus coastal cities. As SEZ initiatives extend to interior regions, it becomes essential to examine their specific contributions to local economic transformation.

This study seeks to address these gaps by investigating the influence of SEZ policies on India's HQED, with particular attention to inland cities, and by identifying the mechanisms through which these policies foster development. Using panel data for 51 large and medium-sized Indian cities spanning 2013 to 2021, this study employs a difference-in-differences (DID) framework combined with stepwise regression analysis to investigate the following research questions: Do SEZ policies enhance HQED levels in India? How do these impacts vary between coastal and inland cities? Through which mechanisms, such as trade facilitation and investment liberalization, do SEZ policies promote HQED?

THEORETICAL ANALYSIS AND HYPOTHESIS

The development of international trade represents an inevitable trend, and countries worldwide are actively integrating into it. The SEZ policy represents India's institutional innovation initiative in response to the evolving international trade environment (Liu & Jin, 2022; Xi et al., 2021; Zheng, 2021). It aims at enhancing India's influence in global market competition through institutional reform and innovation. By attracting foreign investment within a more open and flexible market environment, the policy exerts a macroeconomic effect that contributes to the advancement and promotion of HQED (L. Chen & Huo, 2022; Ding et al., 2022).

Trade Facilitation

The establishment of SEZs has introduced significant institutional innovations, with proactive market-opening policies stimulating institutional dividends (Rangarajan 2022). Based on improvements to the institutional system, local SEZ administrations have actively optimized the functions of the administrative management system. This includes appropriate delegation of authority to grassroots service departments and personnel (Liu et al., 2023; Xi & Mei, 2022), moderately easing regulatory controls while ensuring market stability and health, and introducing advanced management methods (Srinivasan 2023).

Along the trade facilitation pathway, SEZ policies promote the liberalization of goods, capital, and enterprise flows by streamlining administrative approvals, reducing tariff barriers (Tripathy & Mishra 2024), and improving transportation infrastructure (Swaminathan et al. 2021). These strategies directly enhance the efficiency of regional and international resource circulation, attract industrial agglomeration, and foster market integration (Desai & Patel 2022). Ultimately, they strengthen international trade capacity and market expansion, forming the mediating variable of trade facilitation, which supports the outward-oriented transformation essential to regional HQED (M. Chen & Wang, 2022; Zhang et al., 2021).

Investment Liberalization

According to the location advantage theory, the investment behaviour of multinational companies is influenced by regional advantages, which determine their willingness to engage in attracting foreign direct investment (FDI). The SEZ policy strengthens these advantages through removing restrictions on foreign equity ratios (Pillai & Ramesh 2024), providing loans for facility construction (Bhattacharyya & Sen 2022), and simplifying the approval procedures (Defever et al., 2019; Dubinina, 2023; Hua et al., 2023). The reduction of tariffs is one of the most direct means of promoting trade. By relaxing restrictions under trade facilitation measures, the mobility of technology, capital, and human resources in the market is enhanced, thereby improving the efficiency of various production factors (Nair et al. 2023). The inflow of foreign enterprises

introduces new products, technologies, and industrial chains, which in turn stimulate the development of domestic enterprises through supply chain linkages (Luo & Qu, 2023).

Along the investment liberalization pathway, SEZ policies attract greater foreign investment by lowering investment barriers and easing investment market entry restrictions (Cizkowicz et al., 2021; Moberg & Tarko, 2021; Nguyen & Tien, 2021). Since India maintains specific restrictions on foreign investment across certain industries and commodities, the introduction of the negative list management system under the SEZ framework offers a practical solution (Jain & Mehrotra 2022). Through further relaxation of restrictions on market access, SEZs are able to attract more foreign investors and financial capital for the development of industrial parks (Menon & Iyer 2023). The increased flow of technical factors also generates new development opportunities for domestic enterprises. The RMB-equivalent RBI currency management framework reduces government intervention, enhancing the vitality of the financial market, improving the overall business environment, and reducing financing costs (Narayana & Pillai 2021). Collectively, these measures form the mediating mechanism generating investment liberalization as a variable, thereby supporting the outward-oriented transformation required for regional HQED (Gu et al., 2021; Jahanger, 2021; Zamani & Tayebi, 2022). Based on this research logic, the following hypotheses are proposed:

H1 The establishment of SEZs significantly promotes regional HQED.

H2 SEZ policies exert a more positive impact on promoting HQED in inland cities.

H3 SEZ policies enhance HQED by improving trade facilitation and investment liberalization.

METHODOLOGY

The empirical analysis is based on data obtained from the Annual Survey of Industries, the Reserve Bank of India's Handbook of Statistics on Indian Economy, the Ministry of Commerce and Industry's SEZ Performance Reports, and the National Sample Survey Office, which provide consistent and authoritative statistical information for the period 2013 to 2021. To mitigate sample bias, data from state-level administrative units were disaggregated into datasets representing nationally recognized large and medium-sized cities. A total of 51 cities were selected for analysis, including 36 large and medium-sized cities without SEZs from 2013 to 2021, 15 cities that received new formal SEZ notifications under the 2019 SEZ Amendment Act, and two cities Raipur and Jodhpur which received formal SEZ notifications in 2021.

The SEZs established prior to 2005 and in the immediate post-Act period (2006 to 2010) were located predominantly in coastal export-oriented cities with relatively early economic development. A joint study of SEZs established under different economic conditions and timeframes could bias the experimental results. To control for potential confounding effects, this study therefore includes only SEZs formally notified in 2019, examining the heterogeneous impacts of coastal and inland SEZs on HQED during the same policy period. Missing data for certain cities were partially imputed using interpolation methods (Kuo et al., 2020).

Model Setting

The Difference-in-Differences (DID) model provides a robust econometric framework for estimating the causal effects of policy implementation (Gao et al., 2022; Hardaker, 2020; Vu & Yamada, 2022). This method effectively controls unobserved individual effects that are constant over time and is particularly applicable in research settings with rich panel data and clear policy interventions (Bosco & Maranzano 2025). Although the DID method does not completely eliminate unobservable factors, it provides a more flexible policy evaluation environment and is well-suited to complex economic problems (Berger, 2021; Kastratovic, 2020). This study employs panel data from large and medium-sized Indian cities to examine the practical effects of SEZ policies and constructs an econometric model based on the DID framework. The treatment group consists of 15 cities that received formal SEZ notifications in 2019, whereas the control group comprises 36 cities that did not implement SEZ policies during the study period. The model setting is expressed in Equation (1):

$$HQDI_{it} = \beta_0 + \beta_1 DID_{it} + \beta_2 Control_{it} + \delta_i + \mu_t + \varepsilon_{it} \quad (1)$$

i and t refer to specific cities and corresponding years, respectively; $HQDI_{it}$ is the dependent variable and represents the HQED level of city i in year t; DID_{it} is the policy dummy variable and is an independent variable (it equals 1 if the city received a formal SEZ notification in 2019, otherwise it is 0); $Control_{it}$ is a vector of control variables; and β_0 is the constant term.

Based on Equation (1), a stepwise regression approach is employed to establish a mediation framework, identifying the mechanisms through which trade facilitation and investment liberalization function as intermediary variables (Verma et al. 2021). The Sobel test and Bootstrap test are used to verify the results:

$$M_{it} = \alpha_0 + \alpha_1 DID_{it} + \alpha_2 Control_{it} + \delta_i + \mu_t + \varepsilon_{it} \quad (2)$$

$$HQDI_{it} = \gamma_0 + \gamma_1 DID_{it} + \gamma_2 M_{it} + \gamma_3 Control_{it} + \delta_i + \mu_t + \varepsilon_{it} \quad (3)$$

The mediating variables, expressed as M_{it}, represent trade facilitation and investment liberalization. Equation (2) estimates the impact of SEZ policies on the mediating variables, while Equation (3) evaluates the mediating role of variables between SEZ policies and HQED (J. Chen et al., 2020; Obuobi et al., 2022).

Dependent Variable

Following the high-quality development framework and drawing on Datta (2021) and Anand & Thampi (2020), this study constructs an HQED evaluation system to measure the High-Quality Economic Development Index (HQDI) from five perspectives (W. Chen et al., 2022; K. Li et al., 2022; Q. Ma et al., 2021): technological innovation, regional coordination, green development, market openness, and shared prosperity. Based on the results of the CRITIC weighting method, the dependent variable HQDI is used to evaluate the level of HQED.

Table 1. HQDI measurement system

Secondary Indicator	Basic Indicators	Indicator Measurement Method	Type
Innovative	R&D investment (A1)	R&D investment / GSDP	(+)
	S&T expenditure (A2)	Science and technology expenditure / Public finance expenditure	(+)
	Patent application (A3)	Number of patent applications granted	(+)
Coordinated	Public fiscal expenditure (B1)	Public fiscal expenditure / GSDP	(+)
	Urban-rural structure (B2)	Urbanization rate	(+)
	Industrial structure (B3)	Tertiary industry / GSDP	(+)
	Demand structure (B4)	Total retail sales of consumer goods / GSDP	(+)
Green	Environmental protection (C1)	Fiscal expenditure on pollution control and environmental conservation / Public finance expenditure	(+)
	Green coverage (C2)	Green coverage rate of built-up area	(+)
	Energy consumption (C3)	Consumption of electric power	(-)
Open	Foreign investment openness (D1)	Actual utilization of foreign capital / GSDP	(+)
	Foreign trade openness (D2)	Total imports and exports volume / GSDP	(+)
	Tourism contribution (D3)	Share of total tourism revenue in GSDP	(+)
Shared	Education expenditure (E1)	Educational expenditure / Public finance expenditure	(+)
	Public medical and health expenditure (E2)	Medical and health expenditure / Public finance expenditure	(+)
	Regional consumption gap (E3)	Per capita consumption expenditure of urban residents / per capita consumption expenditure of rural residents	(-)

Note: (+) and (-) indicate the positive and negative impact of each basic indicator on HQDI.

The CRITIC method is employed to compute the HQDI. First, the data are standardized using models (4) and (5). By integrating indicator variability and inter-correlation, the method objectively determines weights and mitigates biases arising from single-criterion weighting schemes. The core of this calculation method lies in two indicators: the contrast intensity and the conflict index. As shown in model (6), the comparative strength (S_j) and conflict (R_j) between the indicators are used to measure the weight of each basic indicator. In the third step, the amount of information is normalized using model (7) to obtain the final weight of each secondary indicator, expressed as W_j.

The first step is standardization:

$$x'_{ij} = \frac{X_{ij} - \min(X_{ij})}{\max(X_{ij}) - \min(X_{ij})} \quad (4)$$

$$x'_{ij} = \frac{\max(X_{ij}) - X_{ij}}{\max(X_{ij}) - \min(X_{ij})} \quad (5)$$

Step 2: Derive the relative weights of the basic indicators:

$$C_j = S_j \times R_j = \sqrt{\frac{\sum_{p=1}^{n}(X_{ij} - \bar{x}_i)^2}{n-1}} \times \sum_{t=1}^{p}(1 - r_{jt}) \quad (6)$$

Step 3: Derive the relative weights of the secondary indicators:

$$x'_{ij} = \frac{X_{ij} - \min(X_{ij})}{\max(X_{ij}) - \min(X_{ij})} \quad (7)$$

Independent Variable

The independent variable, DID_{it} = $Treat_i$ × $Post_t$, is an interaction term consisting of a time dummy variable and a policy dummy variable. If a city belongs to the experimental group (i.e., it received a formal SEZ notification in 2019), $Treat_i$ = 1; otherwise, for the control group (cities without new SEZ designations), $Treat_i$ = 0. If the observation period falls in or after 2019, $Post_t$ = 1; otherwise $Post_t$ = 0.

Control Variable

$Control_{it}$ denotes control variables. Referring to Patel & Bhatt (2023) and Rao & Kaur (2022), six economic indicators are selected, all of which are log-transformed to minimize scale-related bias and enhance data stability (Guan et al., 2023; Lai & Chang, 2023; Zhao & He, 2022). (1) Fixed Capital Formation level (FAI): the logarithm of the annual growth rate of gross fixed capital formation. (2) Financial Development Level (FD): the logarithm of the ratio of scheduled commercial bank credit to GSDP. (3) Tourism Development Level (TDL): the logarithm of the ratio of total tourism revenue to GSDP. (4) Industrial Structure (IS): the logarithm of the ratio of the gross output value of the tertiary industry to GSDP. (5) Consumption Capacity (CC): the logarithm of the ratio of total retail sales of consumer goods to GSDP. (6) Government Development Level (GDL): the logarithm of the ratio of government fiscal revenue to GSDP (Jiang et al., 2021; Lin et al., 2023; Wang et al., 2022).

The data on SEZ construction were sourced from the official website of the Ministry of Commerce and Industry's SEZ India portal. All data are described in Table 2.

Table 2. Data Description List

VARIABLES	N	Mean	Std.dev.	Min	Max
HQDI	459	0.453	0.119	0.091	0.788
FAI	459	1.934	1.812	-3.876	4.198
FD	459	0.201	0.684	-2.734	1.912
TDL	459	-1.867	1.089	-8.341	-0.128
IS	459	-0.712	0.228	-1.314	-0.149
CC	459	-0.883	0.251	-1.724	-0.123
GDL	459	-2.413	0.334	-3.398	-1.572

RESULT AND DISCUSSION

Basic Regression Analysis

Table 3 presents the results obtained from model (1). The regression outputs are all highly significant, indicating that the six variables such as FAI, FD, and TDL had no effect on the results. When the control variables are considered, the R^2 value increases from 0.487 to 0.574, confirming the validity of their selection. The HQED level of SEZ cities is 6.12% higher than that of non-SEZ cities, thereby confirming Hypothesis H1. Despite differences in control variables and sample selection, the findings are consistent with those of Patel & Bhatt (2023), Gupta & Sinha (2023), and Chakraborty & Bose (2023). The results corroborate the robustness of the conclusion that SEZ policies significantly promote HQED in pilot cities, with no statistically significant effect observed in non-SEZ cities.

Table 3. Impact of SEZ on HQED: Basic regression results

Variables	HQDI (1)	HQDI (2)
DID	0.0701***	0.0612***
	(0.0183)	(0.0169)
FAI		-0.000521
		(0.00271)
FD		-0.0891***
		(0.0213)
TDL		0.0204**
		(0.00913)
IS		0.258***
		(0.0589)
CC		0.163***
		(0.0371)
GDL		0.0719**
		(0.0316)
Constant	0.441***	1.023***
	(0.00472)	(0.0861)
Time FE	be	be
City FE	be	be
Observations	459	459
R-squared	0.487	0.574

Note: p-value is divided into three levels from 0~0.01~0.05~0.1, represented by ***, ** and * respectively.

Parallel Trend Test

The parallel trend assumption constitutes a key prerequisite of the DID model. It requires that, prior to policy implementation, cities with and without SEZ designation exhibit similar development trajectories, thereby ensuring that the observed policy effects stem from exogenous policy shocks. This study uses the year preceding the policy implementation as the baseline period to assess the trend in HQED changes between the treatment and control groups under the influence of the SEZ policy (Galle et al. 2023).

As shown in FIGURE 1, the policy implementation period is represented by pre-, current-, and post-policy phases. The vertical axis represents the regression coefficient, while the solid line indicates changes in βK. The blue dashed lines at each node represent the 5% confidence interval. The graph exhibits no systematic pattern of fluctuation, and βK values before the policy intervention are statistically not significant, satisfying the parallel trends assumption. This implies that prior to policy implementation, HQED differences across cities were not significant. The estimated βK values indicate that from the third period following the policy implementation, the confidence interval of βK no longer includes zero, implying statistical significance. This suggests a lagged policy effect, with the growth potential of regional HQED gradually being realized and the policy impacts strengthening over time.

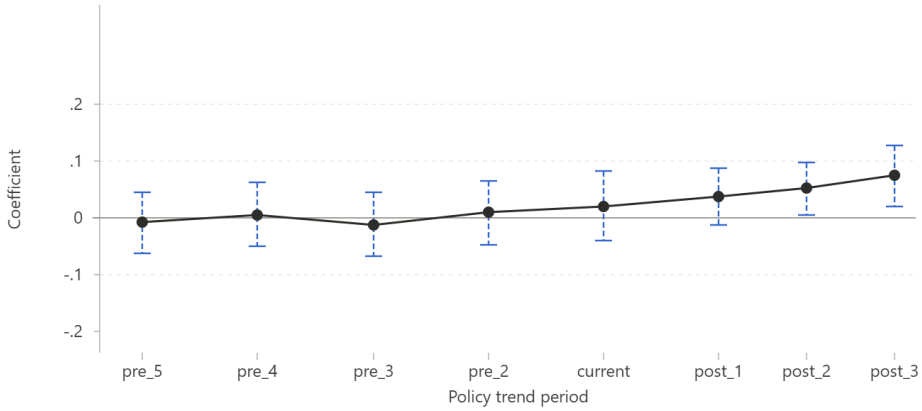

Figure 1. Parallel Trend Test And Dynamic Effects

ROBUSTNESS TESTS

Placebo Test

Although control variables have been added to the baseline regression, not all influencing factors were included. Some unobserved variables may still affect the results. To address this, a placebo test was conducted by randomly generating new experimental groups to assess whether unobserved factors influence HQED. The regression was repeated 500 times to observe the distribution of the estimated coefficients. Given the nature of random sampling, if the placebo regression coefficients are centred around zero, it indicates that under random assignment, the so-called policy effect does not systematically deviate from zero; in other words, the random assignment does not produce significant effects (Jain & Mehrotra 2022). Conversely, if the baseline regression results were driven solely by random factors or unobserved variables, the placebo coefficients would also deviate significantly from zero. If the coefficients cluster around zero, it suggests that the baseline regression results reflect a statistically reliable policy effect rather than being driven by unobserved factors (Gupta & Sinha 2023), thereby providing indirect support for the validity of the model estimates.

After random sampling, the regression coefficient follows a normal distribution and is concentrated around zero (FIGURE 2). The coefficient of the basic regression (0.0612) is significantly larger than the placebo coefficients, indicating that the baseline results are not driven by random chance. This suggests that unobserved characteristics have minimal effect on the estimates. Overall, the placebo test provides additional evidence supporting the conclusion that the SEZ policy in inland cities contributes positively to HQED in the designated regions.

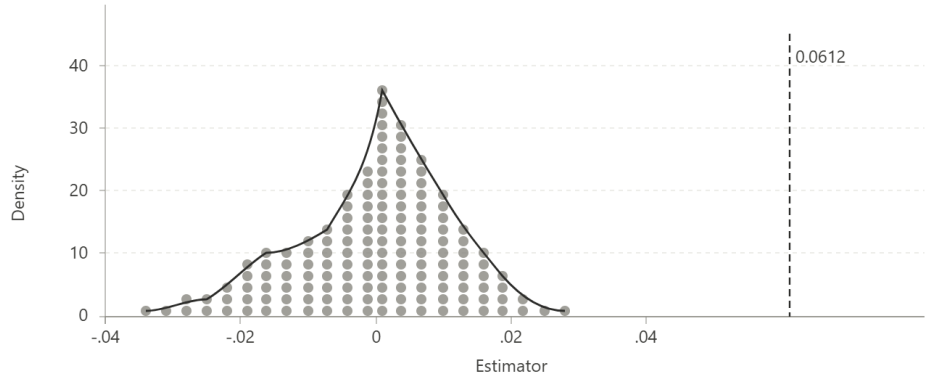

Figure 2. Distribution of coefficient estimates from 500 random draws

Replace The Explained Variable

The regression is repeated with GDP per capita as the dependent variable, with other parameters remaining unchanged. The results are compared with those of the previous studies (TABLE 4). From the results of models (3) and (4), the regression results are significant, indicating that SEZ policies exert a positive impact on GDP per capita. The regression results obtained after changing the dependent variable further strengthen the conclusions above.

According to the findings shown in Table 3 and Table 4, the driving effect of SEZs on per capita GDP is significantly stronger than that on HQED. Evidently, the development index constructed using the evaluation index system provides a more comprehensive measure of HQED.

Table 4. Regression results after changing the explained variable

VARIABLES	GDP (3)	GDP (4)	HQDI_P (5)	HQDI_P (6)
DID	0.243*	0.287**	0.0918**	0.0834**
	(0.153)	(0.142)	(0.0413)	(0.0398)
FAI		0.00132		-0.00401
		(0.0229)		(0.00641)
FD		-1.136***		-0.0713
		(0.181)		(0.0509)
TDL		0.0254		0.0281
		(0.0762)		(0.0215)
IS		0.132		0.117
		(0.497)		(0.140)
CC		-0.943***		0.489***
		(0.309)		(0.0876)
GDL		-0.601**		0.0479
		(0.267)		(0.0756)
Constant	5.934***	3.871***	1.641***	2.387***
	(0.0397)	(0.727)	(0.0109)	(0.204)
Time FE	be	be	be	be
City FE	be	be	be	be
Observations	459	459	459	459
R^2	0.927	0.939	0.789	0.811

Note: p-value is divided into three levels from 0~0.01~0.05~0.1, represented by ***, ** and * respectively.

In order to reduce the potential impact of the indicator computation method, the Principal Component Analysis (PCA) approach is also employed to measure HQDI. The PCA results reveal that the first seven components have eigenvalues greater than 1, cumulatively explaining over 63% of the total variance. The seven principal components are used to derive the composite score for subsequent regression analysis, with the results presented in columns (5) and (6) of TABLE 4. When the dependent variable is remeasured using this alternative method, the regression results remain statistically significant, further confirming the robustness of the conclusions.

Regional Heterogeneity Analysis

The preceding experimental results confirm Hypothesis H1 regarding the promotion effect of SEZs on HQED. However, given the disparities in geographical location and economic foundations across India, Hypothesis H2 requires further verification. The hypothesis posits that inland cities, characterized by weaker economic foundations and greater distance from ports and coastlines, will be more strongly influenced by SEZ policies. In order to verify this conjecture, the study examines potential regional variations in policy implementation.

The sample cities are categorized as either inland cities or coastal cities according to their geographical locations, and separate regressions are conducted for each group. The findings indicate that SEZs significantly enhance HQED in inland cities, whereas their effect on coastal cities is statistically insignificant (TABLE 5). This indicates that the spatial distribution of cities influences policy effectiveness. Specifically, compared with coastal cities, the HQED of inland cities is more significantly affected by SEZ policies. Coastal cities, as the earliest participants in India's trade liberalization and export-led industrialization, demonstrate relatively advanced levels of economic development. Owing to their advantageous geographic locations and early industrialization, coastal cities benefit from stronger international trade linkages and maintain a more mature industrial structure, whereas inland cities remain largely dependent on agriculture and informal manufacturing. As a

policy to promote regional economic openness, SEZs are more likely to drive HQED in less open regions. Hypothesis H2 is therefore confirmed. Consistent with this finding, Bhattacharya et al. (2022) reported that the impact of SEZ policies on economic growth is considerably stronger in inland cities than in coastal regions.

Table 5. Impact of SEZ on HQED: Regional heterogeneity

VARIABLES	HQDI Inland (7)	HQDI Inland (8)	HQDI Coastal (9)	HQDI Coastal (10)
DID	0.0831***	0.0623***	0.0219	0.0541
	(0.0211)	(0.0203)	(0.0374)	(0.0351)
FAI		-0.00489		0.00621
		(0.00347)		(0.00447)
FD		-0.0641***		-0.1659***
		(0.0263)		(0.0391)
TDL		0.0419**		0.00791
		(0.0181)		(0.0109)
IS		0.261***		0.271**
		(0.0682)		(0.144)
CC		0.194***		0.181***
		(0.0529)		(0.0529)
GDL		0.0301		0.137**
		(0.0399)		(0.0691)
Constant	0.439***	0.991***	0.461***	1.189***
	(0.00562)	(0.1023)	(0.00876)	(0.226)
Time FE	be	be	be	be
City FE	be	be	be	be
Observations	342	342	117	117
R^2	0.514	0.604	0.431	0.541

Note: p-value is divided into three levels from 0~0.01~0.05~0.1, represented by ***, ** and * respectively.

The conclusions of existing literature remain far from consistent. Most scholars, using all district-level cities or state-level panel data as samples, have found that the SEZ policy significantly promotes HQED in coastal cities (Patel & Bhatt 2023; Rao & Kaur 2022; Gupta & Sinha 2023). However, when the analysis is conducted with the samples screened in this study, the significant effect disappears for coastal cities, primarily due to differences in sample composition. Within the broader scope of all district-level cities or states, substantial disparities exist among coastal cities. Many small and medium-sized coastal cities exhibit relatively low HQED baselines, allowing the SEZ policy to generate stronger marginal effects in these cities and thereby producing a significant overall effect for the coastal region. These divergences in findings, driven by sample selection, not only reveal the importance of regional heterogeneity but also underscore the necessity of the present study.

By selecting only medium- and large-sized cities, this study excludes many small coastal cities with large disparities in development levels. After controlling for the influence of city size, the remaining medium- and large-sized coastal cities possess relatively high economic foundations, which limit the marginal impact of the policy. Consequently, the regression coefficient decreases and statistical significance is no longer observed. Therefore, the non-significance of the SEZ coefficient for coastal cities after sample selection does not contradict existing studies but reflects differences in marginal effects of the policy across samples.

Influencing Mechanism Analysis

Based on theoretical analysis, this study posits that SEZ policy primarily drives HQED through two channels: enhancing trade facilitation and liberalizing investment, respectively measured by total import and export trade volume (Trade) and actual utilization of foreign capital (FDI). The specific empirical results are shown in Table 6 and Table 7.

Table 6. Impact of SEZ on HQED: Mechanism of action

VARIABLES	Trade (11)	FDI (12)	HQDI (13)	HQDI (14)

DID	362.4***	68.92**	0.0521***	0.0573***
	(131.7)	(33.14)	(0.0167)	(0.0168)
Trade			2.61e-05***	
			(6.83e-06)	
FDI				5.98e-05**
				(2.61e-05)
FAI	16.83	8.924*	-0.000934	-0.00112
	(20.64)	-5.321	(0.00265)	(0.00266)
FD	-71.43	-54.92	-0.0873***	-0.0856***
	(162.6)	(41.98)	(0.0210)	(0.0212)
TDL	24.18	17.84	0.0196**	0.0192**
	(68.91)	(17.79)	(0.00893)	(0.00901)
IS	-921.4**	-87.34	0.281***	0.262***
	(448.7)	(115.8)	(0.0581)	(0.0584)
CC	-187.3	102.8	0.168***	0.156***
	(279.6)	(72.19)	(0.0360)	(0.0365)
GDL	389.2*	108.7*	0.0621**	0.0648**
	(241.8)	(62.44)	(0.0312)	(0.0316)
Constant	971.3	421.9***	0.997***	0.994***
	(656.0)	(169.3)	(0.0848)	(0.0861)
Time FE	be	be	be	be
City FE	be	be	be	be
Observations	459	459	459	459
R^2	0.858	0.929	0.598	0.594

Note: p-value is divided into three levels from 0~0.01~0.05~0.1, represented by ***, ** and * respectively.

Table 7. Sobel and Bootstrap test results on the mechanism of action

	Trade	FDI
Sobel P	0.02013	0.04781
Z	2.321**	1.993**
Bootstrap [95% conf. interval]	.0009843 .0157621	.0011283 .0159874

The regression results in column (11) are significantly positive, indicating that the SEZ policy enhances regional trade facilitation. After incorporating trade facilitation, column (13) displays significantly positive coefficients for both SEZ and trade facilitation, thereby confirming the mediating effect of market openness on HQED (TABLE 7). The Sobel test yields a P value of 0.02013, indicating statistical significance, while the Bootstrap test confidence interval excludes zero, further validating the mediating effect. This finding implies that the SEZ policy not only directly promotes HQED but also indirectly improves it by significantly enhancing trade facilitation (Tripathy & Mishra 2024; Swaminathan et al. 2021).

The regression results in column (12) are significantly positive, indicating that the SEZ policy facilitates investment liberalization. After incorporating investment liberalization, the coefficient in column (14) remains significant, confirming its mediating effect on HQED. The robustness of these results is verified through both Sobel and Bootstrap tests. The Sobel test yields a p-value of 0.04781 and the Bootstrap confidence interval excludes zero, reaffirming the mediating role of investment liberalization. Both tests support the above conclusions. These results suggest that investment liberalization serves as an additional mediating channel through which the SEZ policy promotes HQED (Pillai & Ramesh 2024; Menon & Iyer 2023). Hence Hypothesis H3 is verified: the SEZ policy promotes HQED by improving trade facilitation and investment liberalization.

CONCLUSION

This study confirms that Special Economic Zone (SEZ) policy plays a significant role in promoting high-quality economic development (HQED) in India. Using city-level panel data from 2013 to 2021 and a Difference-

in-Differences (DID) approach, the findings show that cities granted SEZ status experience higher HQED levels than non-SEZ cities. This result remains consistent across parallel trend tests, robustness checks, and placebo tests. The impact of SEZ policy is more pronounced in inland cities than in coastal cities, indicating that institutional reform, trade facilitation, and investment liberalization are more effective in supporting economic upgrading in regions with relatively weaker development foundations. The study further demonstrates that trade facilitation and investment liberalization serve as key transmission mechanisms through which SEZ policy enhances HQED.

From a policy perspective, the findings highlight the need to strengthen trade infrastructure, simplify customs procedures, expand foreign investment access, and develop export-oriented industrial clusters, particularly in inland regions. However, this study is limited by its sample scope, observation period, and lack of sector-specific analysis. Future research should extend the study period, broaden the city sample, and examine the effects of SEZ policy across different industrial sectors.

REFERENCES

Aritenang, A. F., & Chandramidi, A. N. (2020). The Impact of Special Economic Zones and Government Intervention on Firm Productivity: The Case of Batam, Indonesia. *Bulletin of Indonesian Economic Studies*, *56*(2), 225–249. https://doi.org/10.1080/00074918.2019.1643005

Berger, A. (2021). Facilitating Sustainable Investment To Build Back Better. *Journal of World Trade*, *55*(6), 883–894. https://doi.org/10.54648/trad2021037

Chen, J., Liu, Y., & Liu, W. (2020). Investment facilitation and China's outward foreign direct investment along the belt and road. *China Economic Review*, *61*, 101458. https://doi.org/10.1016/j.chieco.2020.101458

Chen, L., & Huo, C. (2022). The Measurement and Influencing Factors of High-Quality Economic Development in China. *Sustainability*, *14*(15), 9293. https://doi.org/10.3390/su14159293

Chen, M., & Wang, H. (2022). Import technology sophistication and high-quality economic development: Evidence from city-level data of China. *Economic Research-Ekonomska Istraživanja*, *35*(1), 1106–1141. https://doi.org/10.1080/1331677X.2021.1956362

Chen, W., Su, Z., Wang, Y., Wang, Q., & Zhao, G. (2022). Do the rank difference of industrial development zones affect land use efficiency? A regional analysis in China. *Socio-Economic Planning Sciences*, *80*, 101168. https://doi.org/10.1016/j.seps.2021.101168

Cizkowicz, P., Cizkowicz-Pekala, M., Pekala, P., & Rzonca, A. (2021). Why do Some Special Economic Zones Attract More Firms than Others? Panel Data Analysis of Polish Special Economic Zones. *Prague Economic Papers*, *30*(1), 61–89. https://doi.org/10.18267/j.pep.763

Defever, F., Reyes, J.-D., Riano, A., & Sanchez-Martin, M. E. (2019). Special Economic Zones and WTO Compliance: Evidence from the Dominican Republic. *Economica*, *86*(343), 532–568. https://doi.org/10.1111/ecca.12276

Ding, C., Liu, C., Zheng, C., & Li, F. (2022). Digital economy, technological innovation and high-quality economic development: Based on spatial effect and mediation effect. *Sustainability*, *14*(1), 216. https://doi.org/10.3390/su14010216

Dubinina, E. (2023). Impact of Special Economic Zones on domestic market: Evidence from Russia. *Post-Communist Economies*, *35*(1), 82–99. https://doi.org/10.1080/14631377.2022.2138154

Gao, M., Gu, Q., & He, S. (2022). Place-based policies, administrative hierarchy, and city growth: Evidence from China. *Economic Modelling*, *115*, 105952. https://doi.org/10.1016/j.econmod.2022.105952

Gu, W., Wang, J., Hua, X., & Liu, Z. (2021). Entrepreneurship and high-quality economic development: Based on the triple bottom line of sustainable development. *International Entrepreneurship and Management Journal*, *17*(1), 1–27. https://doi.org/10.1007/s11365-020-00684-9

Guan, C., Huang, J., Jiang, R., & Xu, W. (2023). The impact of pilot free trade zone on service industry structure upgrading. *Economic Analysis and Policy*, *78*, 472–491. https://doi.org/10.1016/j.eap.2023.03.024

Hardaker, S. (2020). Embedded Enclaves? Initial Implications of Development of Special Economic Zones in Myanmar. *European Journal of Development Research*, *32*(2), 404–430. https://doi.org/10.1057/s41287-020-00271-2

Hua, Y., Partridge, M., & Sun, W. (2023). Pollution effects of place-based policy: Evidence from China's development-zone program. *Journal of Regional Science*, *63*(3), 703–727. https://doi.org/10.1111/jors.12637

Jahanger, A. (2021). Influence of FDI characteristics on high-quality development of China's economy. *Environmental Science and Pollution Research*, *28*, 18977–18988. https://doi.org/10.1007/s11356-020-09187-0

Jiang, Y., Wang, H., & Liu, Z. (2021). The impact of the free trade zone on green total factor productivity: Evidence from the Shanghai pilot free trade zone. *Energy Policy*, *148*, 112000. https://doi.org/10.1016/j.enpol.2020.112000

Kastratovic, R. (2020). The impact of foreign direct investment on host country exports: A meta-analysis. *The World Economy*, *43*(12), 3142–3183. https://doi.org/10.1111/twec.13011

Kuo, K.-C., Lu, W.-M., Nguyen, D. T., & Wang, H. F. (2020). The effect of special economic zones on governance performance and their spillover effects in Chinese provinces. *Managerial and Decision Economics*, *41*(3), 446–460. https://doi.org/10.1002/mde.3112

Lai, L., & Chang, Y. (2023). Do China's pilot free trade zones promote green dual-circulation development? Based on the DID model. *PLOS ONE*, *18*(3), e0281054. https://doi.org/10.1371/journal.pone.0281054

Li, K., Gao, S., Liao, Y., Luo, K., & Wang, S. (2022). The Impact of Development Zones on China's Urbanization from the Perspectives of the Population, Land, and the Economy. *Land*, *11*(10), 1726. https://doi.org/10.3390/land11101726

Li, X., Wu, X., & Tan, Y. (2021). Impact of special economic zones on firm performance. *Research in International Business and Finance*, *58*, 101463. https://doi.org/10.1016/j.ribaf.2021.101463

Lin, X., Leng, L., & Qiu, Y. (2023). Research on the policy effect of Free Trade Zone on regional innovation capability: Evidence from China. *Applied Economics Letters*, *30*(5), 689–694. https://doi.org/10.1080/13504851.2021.2011101

Liu, Y., & Jin, Y. (2022). Special economic zones, export status, and firms' productivity: Theory and evidence from China. *Review of Development Economics*, *26*(3), 1338–1360. https://doi.org/10.1111/rode.12883

Liu, Y., Wu, Y., & Zhu, X. (2023). Development zones and firms' performance: The impact of development zones on firms' performance for a Chinese industrial cluster. *Regional Studies*, *57*(5), 868–879. https://doi.org/10.1080/00343404.2022.2107192

Lu, Y., Wang, J., & Zhu, L. (2019). Place-Based Policies, Creation, and Agglomeration Economies: Evidence from China's Economic Zone Program. *American Economic Journal: Economic Policy*, *11*(3), 325–360. https://doi.org/10.1257/pol.20160272

Luo, H., & Qu, X. (2023). Export Trade, Absorptive Capacity, and High-Quality Economic Development. *Systems*, *11*(2), 54. https://doi.org/10.3390/systems11020054

Ma, Q., Zhang, Y., Yang, K., & He, L. (2021). Have China's Pilot Free Trade Zones Improved Green Total Factor Productivity? *International Journal of Environmental Research and Public Health*, *18*(21), 11681. https://doi.org/10.3390/ijerph182111681

Ma, T., Cao, X., & Zhao, H. (2023). Development zone policy and high-quality economic growth: Quasi-natural experimental evidence from China. *Regional Studies*, *57*(3), 590–605. https://doi.org/10.1080/00343404.2022.2093342

Moberg, L., & Tarko, V. (2021). Special economic zones and liberalization avalanches. *Journal of Entrepreneurship and Public Policy*, *10*(1), 120–139. https://doi.org/10.1108/JEPP-01-2021-0008

Nguyen, H. Q., & Tien, D. N. (2021). Special Economic Zones and FDI Attraction to Districts in Vietnam: A Non-Parametric Approach. *Singapore Economic Review*, *66*(4), 1027–1053. https://doi.org/10.1142/S0217590820490077

Obuobi, N. K., Gatsi, J. G., Appiah, M. O., Kawor, S., Amoah, E. K., & Abeka, M. J. (2022). Trade liberalization policies and foreign direct investment inflows in Africa: Evidence from new measures of trade liberalization. *The Journal of International Trade & Economic Development*, *31*(3), 394–409. https://doi.org/10.1080/09638199.2021.1983009

Vu, T. M., & Yamada, H. (2022). Do enterprise zones promote local business development? Evidence from Vietnam. *Journal of Regional Science*, *62*(4), 1206–1224. https://doi.org/10.1111/jors.12593

Wang, L., Liu, Z., & Shi, H. (2022). The Impact of the Pilot Free Trade Zone on Regional Financial Development. *China & World Economy*, *30*(5), 154–184. https://doi.org/10.1111/cwe.12441

Xi, Q., & Mei, L. (2022). How did development zones affect China's land transfers? The scale, marketization, and resource allocation effect. *Land Use Policy*, *119*, 106181. https://doi.org/10.1016/j.landusepol.2022.106181

Xi, Q., Sun, R., & Mei, L. (2021). The impact of special economic zones on producer services productivity: Evidence from China. *China Economic Review*, *65*, 101558. https://doi.org/10.1016/j.chieco.2020.101558

Zamani, Z., & Tayebi, S. K. (2022). Spillover effects of trade and foreign direct investment on economic growth: An implication for sustainable development. *Environment, Development and Sustainability*, *24*(3), 3967–3981. https://doi.org/10.1007/s10668-021-01597-5

Zhang, W., Zhao, S., Wan, X., & Yao, Y. (2021). Study on the effect of digital economy on high-quality economic development in China. *PLOS ONE*, *16*(9), e0257365. https://doi.org/10.1371/journal.pone.0257365

Zhao, T., & He, F. (2022). Does the Pilot Free Trade Zone Promote the Quality of Urban Economic Growth: An Empirical Research Based on Quasi-Natural Experiment. *Sustainability*, *14*(12), 7352. https://doi.org/10.3390/su14127352

Zheng, L. (2021). Job creation or job relocation? Identifying the impact of China's special economic zones on local employment and industrial agglomeration. *China Economic Review*, *69*, 101651. https://doi.org/10.1016/j.chieco.2021.101651