

Development of Pilot Free Trade Zones and Regional Economic Growth in China: Comparison on the Conducting Paths and Dynamic Mechanisms

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This study discusses the effect and the dynamic mechanism of free trade zone (FTZ) development promoting regional economic growth in China from the perspective of institutional innovation, and finds as follows. (1) The identification process based on difference-in-differences (DID) testing and Bayesian information criterion (BIC) indicates that the institutional innovation of FTZs not only drives regional economic growth, but acts as one of the core factors among the many drivers. (2) The rapid development of investment and trade, as the primal core function of FTZs, is an important dynamic factor for FTZs to promote regional economic growth. It means in the macro-context of lasting and repeated China-U.S. trade frictions, FTZ development should refer to the practice of China (Shanghai) Pilot Free Trade Zone and China (Zhejiang) Pilot Free Trade Zone in aligning to high-standard investment and trade criteria, return to the origin of free trade, and actively seek policy support in improving trade openness and investment facilitation. (3) With the synthetic control method used, the study finds a wide gap in the “experimental effect” of setting up FTZs in different areas. The effect is better in coastal FTZs than in inland ones, and FTZs established later usually have less noticeable effect. On this account, FTZs in China should be positioned differently based on their characteristics of location and endowment; featured development modes should be explored to reduce homogeneous competition; development of coastal and inland FTZs should be balanced and coordinated.

Keywords: pilot free trade zone, dynamic mechanism, regional economic growth, difference-in-differences, synthetic control

1. Introduction

As the economic system reform in China has entered a different phase, the

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country urgently needs a breakthrough for the new round of institutional innovation for economic development. As pointed out in the report of the 19th CPC National Congress, we should “grant more powers to pilot free trade zones (FTZs) to conduct reform, and explore the opening of free trade ports. In both central deployments and regional practice, development of pilot FTZs is gradually upgrading, and the opening-up of national pilot FTZs on all fronts is being pursued in an expedited way. Construction of pilot FTZs has developed into the bridgehead of the new round of institutional innovation in China (Wang *et al.*, 2019).

Having analyzed the currently available literature, this study finds some space of expansion in the research on the effect of pilot FTZs on economic growth and its heterogeneity. First, in terms of effect on regional economic growth, current literature mostly studies existence of the effect, but few identifies or tests if FTZ development takes an important position among the many growth drivers. Therefore, on the basis of testing the effect of FTZs on economic growth, further identifying whether FTZ construction is a core factor among the many drivers becomes a primary topic in this study. Second, research on the dynamic mechanisms (conducting paths) behind FTZs’ effect on economic growth, especially the difference in the mechanisms (dynamic failure) among different FTZs, remains to be expanded. Expanding the research in the field is crucial, because reflecting on the difference in the effect of FTZ development from the perspective of dynamic mechanisms is exactly the key to the “black box” of FTZs’ effect and its heterogeneity. Also, investigating what dynamic mechanisms FTZs depend on for promoting economic growth and the difference in the extent of dependence is helpful for refining the dynamic mechanisms through supportive reforms in the future and thus improving the results of FTZ development.

On this account, this study concludes and makes marginal contribution as follows. First, based on the quasi-natural experimental research such as difference-in-differences and synthetic control, it investigates what effect FTZs have in leading regional economic growth and if the effect differs among FTZs of different batches and locations, so as to offer theoretical basis for evaluating and reflecting on the effect of FTZ development. Second, based on Bayesian information criterion (BIC), it identifies whether FTZs play a critical or non-critical role in driving the growth, in order to provide theoretical foundation for promoting the FTZ strategy in depth and constructing the new pattern of comprehensively opening up. Third, with respect to conducting mechanism testing, it constructs core FTZ functional indicators in the four dimensions of import, export, foreign direct investment (FDI) and outbound direct investment (ODI) to test the role of the core functions in FTZs of different batches and locations. Furthermore, it starts from dynamic mechanisms (conducting paths) to reveal the institutional and mechanism reasons behind the significant location difference in the effect of FTZs, and thus provides theoretical support

for positioning FTZs in a differentiated way, reducing homogeneous development and improving differentiated competitiveness. Fourth, dynamic difference at the individual level beyond the regular dimensions of location and batch is sought. With the help of synthetic control, this study further compares the capability gap among different FTZs in using the above-mentioned four core functions (dynamic mechanisms) to drive regional economic growth. This empirical process will offer effective basis for explaining the gap of different FTZs in development and provide favorable theoretical support and policy insights for promoting growth drivers of FTZs to be upgraded.

2. Literature Review and Research Hypotheses

2.1. Analysis on the Effect of FTZs on Economic Growth and the Heterogeneity

Literature that is currently available is not consistent in their research conclusions on if FTZs can drive regional economic growth, and holds individual development difference is probably the main reason behind the inconsistency in general. Tan (2015) took China (Shanghai) Pilot Free Trade Zone as sample and took the lead to study the effect of FTZs on economic growth, finding that the establishment and operation of the Free Trade Zone promoted the growth of import and export of Shanghai and thus drove the development of local economy. This conclusion proved the claim that further liberalized trade can promote economic growth, and also set off a wave of using “counterfactual” methods to study FTZs while recognizing the achievements of Shanghai Pilot Free Trade Zone. Afterwards, Wang (2017) and Liu (2018) respectively used different policy evaluation methods to come to the same conclusion and both proved the significant positive role of FTZs in driving regional economic growth. However, different conclusions were drawn by other scholars. Chen (2014) believed the frequent overlapping of various systems including FTZs and the homogeneous competition among special zones of different types in areas close to each other caused obvious “crowding-out effect” in the development of FTZs and thus severely undermined the policy effect. Zhang (2018) indicated in his research that FTZs of different locations differed widely in their effect and showed heterogeneity in driving regional economic growth. He found the growth effect of coastal FTZs was considerably weaker than that of inland ones, probably because setting up of FTZs brought new drivers of growth for inland areas and effectively made up for their disadvantages in factor endowment and location, but had limited effect on coastal FTZs. Ye (2018) came to consistent conclusions by conducting quasi-natural experimental research, believing FTZs failed to play obvious effect on the economic growth of Tianjin and Fujian. These studies explained to some extent

why opposite conclusions were presented when the effect of FTZs on driving economic growth was analyzed in general.

2.2. Analysis on the Dynamic Mechanisms of the Economic Growth Effect of FTZs

Regarding conducting mechanisms of FTZs in promoting economic growth, most literature analyzes the two channels of “trade” and “investment”. Establishment of FTZs is an important window for China to pursue opening-up on all fronts, and the two channels will involve both domestic and foreign ends, including two-way flows of capital and goods. On the one hand, in the sense of the “trade effect” of trade liberalization, in the long term, literature on the relationship between foreign trade and economic growth generally believes export can bring direct wealth to host countries and promote economic growth, but regards import as decrement of national economic growth (Ji, 2002). However, the reality of countries in the coordinated development between import growth and economic growth is opposite to the theory, which attracts wide attention academically. In theory, Robertson was the first to propose “trade is the engine for growth”, believing import was one of the important channels for promoting economic growth. Import enabled host countries to save input of production factors and helped improve industrial benefits. Import of advanced equipment and technologies especially offered a main driver for the countries’ economic growth, and the competition mechanism of importing products forced domestic enterprises to reform, eliminated outdated capacity and cleared obstacles for economic development. In terms of empirical experience, Romer (1993) utilized cross-section data of 76 developing countries in 1960 to analyze the influence of import on production, finding the important role of import for economic growth. According to literature on FTZs, increase of import and export of FTZs is both important for driving regional economic growth. Based on analysis of the first two batches of FTZs, Liu (2018) found that Shanghai FTZ and Guangdong FTZ played a significant driving role for regional import and thus offered strong vigor to regional economic growth. Yin (2017) studied Shanghai FTZ and came to consistent conclusions that the FTZ significantly promoted the trade of Shanghai and had lasting effect on economic growth. Given so, both import and export of FTZs can provide driving force for regional economic growth.

On the other hand, regarding the “capital effect” of investment facilitation, though outbound direct investment (ODI) is not directly included into GDP accounting, current literature believes ODI can both directly promote the economic growth of home countries (Fan *et al.*, 2004; Pan, 2016) and pose positive effect on the economic growth of host countries through technology spillover effect, investment effect and human capital effect (Desai *et al.*, 2005; Hossain, 2016). Current literature on FTZs also holds ODI and FDI of FTZs are important factors for regional economic growth.

FDI can directly improve quality of domestic assets, bring quality management experience, effectively elevate efficiency of capital utilization and thus promote economic growth; ODI can help host countries cooperate with technologically advanced countries, greatly shorten their cycle of technical innovation by utilizing scientific research platforms and senior talents of advanced countries, and thus drive local economic development. Analyzing in depth the dynamic mechanisms of FTZs realizing the economic growth effect remains an important research that is highly relevant to reality. To this end, this study will conduct research by further refining dynamic indicators.

2.3. Analysis on the Heterogeneity of Dynamic (Conducting) Mechanisms

Though current research finds FTZs of different batches and locations generate different economic growth effects, do FTZs of the same batch and location (such as Tianjin and Fujian that are both pilot FTZs in the second batch and in coastal areas) have significant difference in driving regional economic growth? This is the focus of discussion in this part.

Even for FTZs with relatively significant driving effect on trade, asymmetry is still showed in terms of the direction of driving. For instance, Liu (2018) found the FTZ development had significant influence on the import growth of goods trade in Shanghai, but invisible influence on export. It even exerted negative effect on the import of goods trade in Tianjin, but had no obvious influence on either import or export in Fujian, and the effect on regional economic growth of Tianjin FTZ and Fujian FTZ was not obvious in general. To sum up, because of the gap among different FTZs in location conditions, resource endowment, policy foundation and cultural environment, the conducting mechanisms of policies of FTZs may be blocked and even “fail”. More importantly, even FTZs of the same location and the same batch may have entirely different manifestations of conducting mechanism failure due to the wide gap in policy conditions and endowment.

As mentioned above, this study proposes the following hypotheses.

Hypothesis 1a: Setting up FTZs can significantly drive regional economic growth, but there exists difference among FTZs of different batches and locations.

Hypothesis 1b: The institutional innovation of FTZs not only drives regional economic growth, but acts as one of the core factors among the many drivers.

Hypothesis 2: FTZs can promote regional economic growth through the four dynamic mechanisms of import, export, FDI and ODI. However, pilot FTZs of different batches and locations have different dynamic mechanisms, some of which may fail in working.

Hypothesis 3: Even FTZs of the same batch and the same location have different dynamic mechanisms of driving regional economic growth, due to the variance in resource endowment and location conditions.

3. Empirical Design

3.1. Study Design

Hypothesis 1a focuses on whether FTZs have significant driving effect on regional economic growth or not. As establishment of FTZs can be regarded as a policy “impact”, difference-in-differences (DID) can be adopted to test the driving effect. To be specific, the analysis model on the effect of FTZs on the growth is expressed as:

$$AGDP_{i,t} = \beta_0 + \beta_1 Change_i \times FTZ_t + \xi X_{i,t} + A_i + B_t + \varepsilon_{i,t} \quad (1)$$

Change is a dummy variable for distinguishing the treatment group and the control group (*Change*=1 for treatment group, *Change*=0 for control group). *FTZ* is dummy variable on policy period of FTZs, i.e. *FTZ*=1 for the year of setting up FTZs, and *FTZ*=0 otherwise. $X_{i,t}$ is control variable; B_t is time fixed effect; A_i is individual fixed effect.

Hypothesis 1b, on the basis of the previous hypothesis, mainly studies if FTZs is a core factor for promoting regional economic growth. This is also to further expand the current research. To this end, this study constructs the following determinant analysis model:

$$\begin{aligned} AGDP_{i,t} = & \beta_0 + \beta_1 FTZ + \beta_2 IFA + \beta_3 FD + \beta_4 URB + \beta_5 UNR + \beta_6 EDU \\ & + \beta_7 R \& D + \beta_8 IS + \beta_9 GOV + \beta_{10} RER + \beta_{11} EAG + \beta_{12} APPLY \\ & + \beta_{13} OPEN + \beta_{14} INV + A_i + B_t + \varepsilon_{i,t} \end{aligned} \quad (2)$$

Model (2) takes into consideration the reality that as China's economy is entering the new normal and problems such as resource locking and insufficient endogenous driving force for economic growth are being exposed at a faster pace, government is actively cultivating new drivers of economic development and making effects to develop regional economy, build an innovation-oriented country and pursue opening-up on all fronts. Methodologically speaking, this study refers to the Bayesian information criterion (BIC) proposed by Schwarz (1978) to test determinants for regional economic growth in China in the context of FTZs.

Hypothesis 2 inspects the dynamic mechanisms of FTZs affecting regional economic growth as well as the reasons of the mechanism failure for FTZs of different locations and batches. In another word, it studies if the extent to which FTZs align to high-standard investment and trade criteria is the mediator of their effect on promoting the growth and if FTZs of different locations and batches cause the dynamic mechanisms for driving the growth to fail. To this end, based on model (1), this study

uses a mediating effect model set as follows to test the dynamic mechanisms:

$$AGDP_{i,t} = \alpha_0 + \alpha_1 Change_i \times FTZ_t + \zeta X_{i,t} + A_i + B_t + \varepsilon_{i,t} \quad (4)$$

$$INTER_{i,t} = \beta_0 + \beta_1 Change_i \times FTZ_t + \theta X_{i,t} + A_i + B_t + \varepsilon_{i,t} \quad (5)$$

$$AGDP_{i,t} = \gamma_0 + \gamma_1 Change_i \times FTZ_t + \gamma_2 INTER_{i,t} + \mu X_{i,t} + A_i + B_t + \varepsilon_{i,t} \quad (6)$$

INTER is mediator, including the four dimensions of *IMPORT*, *EXPORT*, *ODI* and *FDI*; other variables are defined similarly as in model (1).

In order to further inspect the variance in development results of FTZs caused by the heterogeneity in dynamic mechanisms and find out the development gap among FTZs, this study uses the synthetic control method to respectively inspect and comparatively analyze the dynamic mechanisms of the first three batches of FTZs. The basic idea of synthetic control is to use data of control group to construct the “counterfactual” effect of treatment group and then compare actual value and simulated value to measure the policy effect.

3.2. Data and Variables

This study selects data of 30 provinces nationwide during 2004–2018 to develop “province-year” balanced panel data.¹ The data is entirely sourced from the official website of National Bureau of Statistics and statistical yearbooks of the provinces, while some missing data is cross-supplemented with WIND and CSMAR.²

Definitions of variables mentioned above and specific statistical dimensions are shown as follows:

Table 1. List of Variable Definitions

Type	Variable symbol	Variable name	Calculating method
Explained variable	<i>AGDP</i>	Per capita GDP	GDP of the year/total population at the year end
	<i>SGDP</i>	GDP growth	(GDP of the year-GDP of the year before)/GDP of the year
Explanatory variable	<i>FTZ</i>	FTZ dummy variable	0 for year with no FTZ, 1 for year with FTZs established

¹ As the statistical dimensions and methods on FDI were greatly adjusted in 2003 and statistics on annual ODI flows originated from 2004, in order to ensure statistical consistency, this study selects the data after 2004. Besides, data on Tibet, Hong Kong, Macao and Taiwan, with a large portion being missing, is deleted to maintain the balance of panel data.

² ODI data is sourced from the *Statistical Bulletin of China's Outward Foreign Direct Investment* for years released by the Ministry of Commerce.

Type	Variable symbol	Variable name	Calculating method
Control variable	<i>IFA</i>	Total investment in fixed assets	Total investment in fixed assets/GDP
	<i>FD</i>	Financial development	Share of non-state-owned total investment in fixed assets in national total investment in fixed assets $\times$ loan balance/GDP
	<i>URB</i>	Urbanization rate	Urban resident population/total regional resident population
	<i>UNR</i>	Unemployment rate	Labor force population without a job in employed population meeting all the employment conditions/total labor force population
	<i>EDU</i>	Education level	Students enrolled in regular higher education institutions/total population
	<i>GOV</i>	Level of government intervention	Public finance expenditure/GDP
	<i>OPEN</i>	Level of trade openness	Total import and export/GDP
	<i>INV</i>	Level of international investment and financing	(FDI+ODI)/GDP
	<i>R&D</i>	Intensity of research and development input	R&D/GDP
	<i>IS</i>	Industrial structure	Value added of the tertiary industry/GDP
Mediator	<i>EAG</i>	Economic agglomeration	GDP per square kilometer in each province
	<i>RER</i>	Environmental regulation	Investment in pollution treatment/prime operating cost of industrial enterprises above the designated size
	<i>FDI</i>	Foreign direct investment	FDI/GDP
	<i>ODI</i>	Outbound direct investment	ODI/GDP
	<i>IMPORT</i>	Import	Import/GDP
	<i>EXPORT</i>	export	Export/GDP

4. Empirical Results and Analysis

Table 2. DID Regression Result

<i>SGDP</i>	(1)	(2)	<i>AGDP</i>	(3)	(4)
$change_i \times FTZ_t$	0.025*** (2.99)	0.030*** (3.46)	$change_i \times FTZ_t$	1.032*** (6.55)	0.708*** (4.95)
Control variable	Uncontrolled	Controlled	Control variable	Uncontrolled	Controlled
Area fixed effect	Controlled	Controlled	Area fixed effect	Controlled	Controlled
Time fixed effect	Controlled	Controlled	Time fixed effect	Controlled	Controlled
cons	0.201*** (31.23)	0.246*** (4.32)	cons	1.405*** (11.54)	5.882*** (6.35)
N	450	450	N	450	450
adj. R^2	0.729	0.733	adj. R^2	0.861	0.899

Note: *, ** and *** respectively mean significance at the 10%, 5% and 1% level; value in parentheses is t value.

DID result indicates that no matter if control variables are added or not, the cross term ($Change_i \times FTZ_t$) shows significant positive correlation with both $SGDP$ and $AGDP$, meaning establishment of FTZs does visibly promote the growth of regional economy.

Taking into account the heterogeneity of FTZs, this study conducts a heterogeneity test over the growth effect of FTZs of different batches and different locations. In order to get cleaner treatment effect, in testing FTZs of different batches, it takes FTZ individuals of some batch as treatment group and other individuals with FTZs of other batches deleted as control group. In testing the effect of FTZs in different areas (coastal or inland), it takes FTZ individuals of some location as treatment group and other individuals with FTZs in other areas deleted as control group. Related empirical results are shown in Table 3 and Table 4.

Table 3. DID Regression Result of FTZs of Different Batches

$SGDP$	(1)	(2)	$AGDP$	(3)	(4)
First-batch FTZs (2013)					
$change_i \times FTZ_t$	0.058*** (3.05)	0.072*** (3.13)	$change_i \times FTZ_t$	2.094*** (5.60)	1.141*** (3.32)
Control variable	Uncontrolled	Controlled	Control variable	Uncontrolled	Controlled
Area fixed effect	Controlled	Controlled	Area fixed effect	Controlled	Controlled
Time fixed effect	Controlled	Controlled	Time fixed effect	Controlled	Controlled
cons	0.210*** (26.18)	0.247*** (3.41)	cons	1.361*** (8.59)	6.739*** (6.18)
N	285	285	N	285	285
adj. R^2	0.750	0.751	adj. R^2	0.834	0.904
Second-batch FTZs (2015)					
$change_i \times FTZ_t$	0.019 (1.52)	0.021 (1.58)	$change_i \times FTZ_t$	1.734*** (6.84)	1.474*** (6.73)
Control variable	Uncontrolled	Controlled	Control variable	Uncontrolled	Controlled
Area fixed effect	Controlled	Controlled	Area fixed effect	Controlled	Controlled
Time fixed effect	Controlled	Controlled	Time fixed effect	Controlled	Controlled
cons	0.206*** (27.08)	0.258*** (3.82)	cons	1.343*** (8.84)	4.365*** (4.00)
N	315	315	N	315	315
adj. R^2	0.746	0.752	adj. R^2	0.845	0.901
Third-batch FTZs (2017)					
$change_i \times FTZ_t$	0.018 (1.49)	0.020 (1.53)	$change_i \times FTZ_t$	0.382* (1.79)	-0.015 (-0.08)
Control variable	Uncontrolled	Controlled	Control variable	Uncontrolled	Controlled
Area fixed effect	Controlled	Controlled	Area fixed effect	Controlled	Controlled
Time fixed effect	Controlled	Controlled	Time fixed effect	Controlled	Controlled
cons	0.205*** (28.52)	0.235*** (3.73)	cons	1.201*** (9.51)	6.017*** (6.79)
N	375	375	N	375	375
adj. R^2	0.737	0.742	adj. R^2	0.854	0.908

Note: *, ** and *** respectively mean significance at the 10%, 5% and 1% level; value in parentheses is t value.

Table 3 takes GDP growth and per capita GDP as explained variables and conducts multi-period DID regression over the “policy impact” of setting up FTZs. According to the empirical result, first, in horizontal comparison, the study finds no matter if control variables are added or not, the regression coefficient of the first-batch FTZs on per capita GDP is greater than that on GDP growth; the second-batch FTZs remain positively significant on per capita GDP at the 1% level, but have limited influence on GDP growth; the third-group FTZs have insignificant effect on the dependent variables except certain positive promoting effect on per capita GDP with no control variable added. In general, setting up FTZs has greater influence and more significant effect on regional per capita GDP, which matches the current reality of dealing simultaneously with the slowdown in economic growth, making difficult structural adjustments and absorbing the effects of the previous economic stimulus policies in China. It means the pressure of economic downturn is relatively universal and GDP growth is under the transition from high speed to medium-high speed. Second, in vertical comparison, with control variables added, only the first two batches of FTZs play a positive promoting role on per capita GDP, and only the first batch has a positive promoting role on GDP growth. Generally speaking, the economic growth effect of FTZs shows a declining trend batch by batch, while the number of FTZs set up in the first three batches is 1, 3 and 7 respectively. This tells us the number of FTZs and their leading effect on economy are not entirely consistent and even negatively correlated, and FTZ development should focus more on improvement of quality, rather than simple increase in quantity.

Table 4. DID Regression Result of FTZs of Different Locations

Inland FTZ	(1) <i>SGDP</i>	(2) <i>AGDP</i>	Coastal FTZ	(3) <i>SGDP</i>	(4) <i>AGDP</i>
$change_i \times FTZ_i$	0.012 (0.93)	0.124 (0.69)	$change_i \times FTZ_i$	0.044*** (3.97)	1.082*** (5.96)
Control variable	Uncontrolled	Controlled	Control variable	Uncontrolled	Controlled
Area fixed effect	Controlled	Controlled	Area fixed effect	Controlled	Controlled
Time fixed effect	Controlled	Controlled	Time fixed effect	Controlled	Controlled
cons	0.263*** (4.26)	6.130*** (7.16)	cons	0.241*** (3.75)	5.065*** (4.83)
N	360	360	N	375	375
adj. R ²	0.764	0.918	adj. R ²	0.722	0.893

Note: *, ** and *** respectively mean significance at the 10%, 5% and 1% level; value in parentheses is *t* value.

According to Table 4, coastal FTZs have a significant driving effect on economic growth, while the effect of inland FTZs is not apparent. This empirical result indicates that development of FTZs cannot be completed overnight, and different provinces

should take their natural endowment, financial support and location conditions into comprehensive consideration, instead of blindly applying for FTZs under the bandwagon effect. FTZs established in hurry to solicit favorable policies are unlikely to play the due role of driving economic growth. Also, the result lays the research foundation for the following discussion on heterogeneity of dynamic mechanisms.

Table 5. Determinant Analysis for Regional Economic Growth

Variable name	(1) BIC	(2) Log-Likelihood	(3) <i>t</i> value	(4) Coefficient	(5) Accumulative R ²	(6) Its own R ²	(7) By group+%	(8) By group-%	(9) By year+%	(10) By year-%
<i>URB</i>	1548.149733	-771.020243	9.87	15.27454	0.7204	0.7204	60		80	
<i>IFA</i>	1500.518075	-744.14979	4.65	1.85287	0.7519	0.0001	80		80	
<i>APPLY</i>	1154.873937	-568.273097	5.17	0.1462946	0.8865	0.7018	60		100	
<i>FTZ</i>	1117.573628	-546.5683187	3.44	1.089045	0.8969	0.2186	60		80	
<i>EDU</i>	1116.282134	-542.867948	2.15	8.578925	0.8986	0.2156	60		80	
<i>FD</i>	1112.452788	-537.8986515	-1.32	-0.6724779	0.9008	0.5282		20		20
<i>EAG</i>	1115.113753	-536.17451	-0.79	-0.1503709	0.9016	0.1772		20		20
<i>R&D</i>	1120.992216	-536.0591176	-0.47	-0.0157674	0.9016	0.2812				
<i>UNR</i>	1126.237474	-535.627123	-0.39	-0.0630281	0.9018	0.1698		20		80
<i>OPEN</i>	1130.526582	-534.717053	-0.61	-0.0211461	0.9022	0.3019	60		20	
<i>GOV</i>	1135.568026	-534.1831511	0.46	0.5823832	0.9024	0.0033	20			
<i>INV</i>	1141.450678	-534.0698534	0.77	-0.90271	0.9025	0.1686				
<i>RER</i>	1043.508965	-482.4928269	0.22	2.287209	0.8987	0.0113	40		20	
<i>IS</i>	1049.539646	-482.48804	0.07	0.0938103	0.8987	0.4588	20		20	

Note: *t* value is the result of calculation after the adjustment of “province” and “year” double cluster-robust standard errors (estimated with Cluster 2 command).

The study further inspects if FTZs are a core factor for regional economic growth. BIC identification shows core variables affecting regional economic growth include *URB*, *IFA*, *FTZ*, *EDU* and *R&D*. This empirical result validates the correctness of hypothesis 1b that in China, establishment of FTZs not only drives regional economic growth, but acts as one of the core factors among the many drivers.

Current literature already reveals the intrinsic connection of investment and trade with economic growth, but hasn't reached consensus on their ultimate direction of influence. In China, does establishment of FTZs affect regional economic development through the channels of investment and trade? Hypothesis 2 is intended to find out the channels and dynamic mechanisms of FTZs affecting economic growth. In combination with the core objective of setting up FTZs, which is to align to high-standard international investment and trade criteria, this study adopts a mediating effect

model and takes *ODI*, *FDI*, *IMPORT* and *EXPORT* as mediators to test the dynamic mechanisms. As pointed out in the previous analysis, FTZs of different locations and different batches show significant difference in their effect on regional economic growth, and this study believes the reason behind such natural difference is failure of dynamic mechanisms, i.e. “dynamic chasm”. In order to verify this hypothesis, the study respectively tests the mediating effect of *ODI*, *FDI*, *IMPORT* and *EXPORT* in different batches and different locations. The specific empirical result is shown as follows:

Table 6. Mechanism Tests on FTZs of Different Batches and Different Locations

	Fist-batch FTZ	Second-batch FTZ	Coastal FTZ
<i>FDI</i>	Insignificant Haven't passed Sobel test	Insignificant	Insignificant
<i>ODI</i>	Fully mediating	Share of mediating effect in total effect: 18.93%	Share of mediating effect in total effect: 22.18%
<i>IMPORT</i>	Share of mediating effect in total effect: 45.57%	Share of mediating effect in total effect: 9.23%	Share of mediating effect in total effect: 14.05%
<i>EXPORT</i>	Share of mediating effect in total effect: 48.99%	Insignificant	Share of mediating effect in total effect: 12.88%

Note: Because of the limited space, this paper only exhibits the final result of mediation test. The specific regression table is available from the authors, if needed.

The empirical result in Table 6 displays that from the perspective of heterogeneity of FTZs of different batches, FTZs have significant spillover effect on regional ODI; ODI as a mediator has a mediating effect that is tested significant in both the first two batches of FTZs and coastal FTZs, with the share of their mediating effect in total effect being fully mediating, 18.93% and 22.18% respectively. This shows FTZs play an important driving role for Chinese capital to go global through a series of institutional innovations such as further opening up the financial market, establishing the negative list system and relaxing restrictions on capital account convertibility; through outbound investment, Chinese enterprises further promote the economic growth of provinces where FTZs are located by using foreign advanced technologies, equipment and management experience. Moreover, the testing result on the mediating effect of *IMPORT* and *EXPORT* shows that the two indicators both have significant mediating effect in the first batch of FTZs, with the share of their mediating effect in total effect reaching 45.57% and 48.99% respectively, while in the second batch, *IMPORT* has its share drop to 9.23% and the mediating effect of *EXPORT* becomes insignificant. One possible explanation for this is that the anti-globalization trend represented by Brexit ahead of schedule (2015) and Donald Trump upholding “America First” being elected U.S. President (2016) is getting increasingly fiercer. Especially under the macro-context of lasting and repeated China-U.S. trade frictions, import and export of China are both severely hit and export is hit even harder than import. The third batch of FTZs set up later are subject to the

influence of the macro global situations to different extents, and so is the test result with *IMPORT* and *EXPORT* as mediators.

Table 7. Provincial and Synthetic Provincial Average Treatment Effect (By Batch)

Average treatment effect	First batch	Second batch					Third batch				
	Shanghai	Tianjin	Guangdong	Fujian	Zhejiang	Liaoning	Sichuan	Hubei	Henan	Chongqing	Shaanxi
<i>FDI</i>	0.018	0.022	-0.015	-0.001	-0.006	-0.016*	-0.010	-0.0002	-0.002	-0.030*	0.002
<i>ODI</i>	0.019*	0.015*	-0.0001	0.003	0.009*	-0.001	-0.0005	-0.0002	0.001	0.007	0
<i>IMPORT</i>	0.900*	0.075	2.382*	0.225	0.068*	0.205	0.156	-0.0196	-0.101	0.202*	0.058
<i>EXPORT</i>	-0.617	-0.010	5.625*	-0.029	0.591*	-0.214*	0.102	0.134	0.243	0.124	0.409

Note: Average treatment effect is the mean value of all the treatment effects from the period when FTZs are established to the last period of observed value. * means related economic variables corresponding to the treatment areas pass the placebo test, and the detailed testing method and process are explained later in the study.

In the sense of heterogeneity of FTZs of different locations, the three channels of *ODI*, *IMPORT* and *EXPORT* in coastal FTZs are tested to have significant mediating effect, with their respective share in total effect being 22.18%, 14.05% and 12.88%. The empirical result proves the reason behind the gap in FTZs' effect on regional economic growth. In another word, heterogeneity of FTZs causes the dynamic mechanisms to fail, and dynamic chasm does exist among FTZs of different batches and different locations. Hypothesis 2 is validated.

To sum up, in general, the test result with *ODI* and *IMPORT* as mediators is significant. In the test on the mediating effect with *EXPORT* as mechanism, the effect in both the first batch of FTZs and coastal ones is significant, and the share of exerting the effect both exceeds 10%. These results prove the correctness of hypothesis 2. In another word, FTZs play a driving role on regional economic growth through the conducting mechanism of "FTZs being established → driving growth of regional investment and trade → promoting growth of regional economy", but pilot FTZs of different batches and different locations have varied dynamic mechanisms for driving the economic growth. Some dynamic mechanisms fail in working.

In order to further study the variance among FTZs in their dynamic mechanisms, this study uses the synthetic control method to respectively test the conducting mechanism of the economic growth effect of the first three batches of FTZs, with the purpose of thoroughly finding out the reason behind failure of the conducting mechanism for some FTZs and opening the "black box" of FTZs promoting regional economic growth. This process of research will offer realistic basis for explaining the development gap among different FTZs and making plans on FTZ development and reform. The empirical result is detailed in Figure 1.

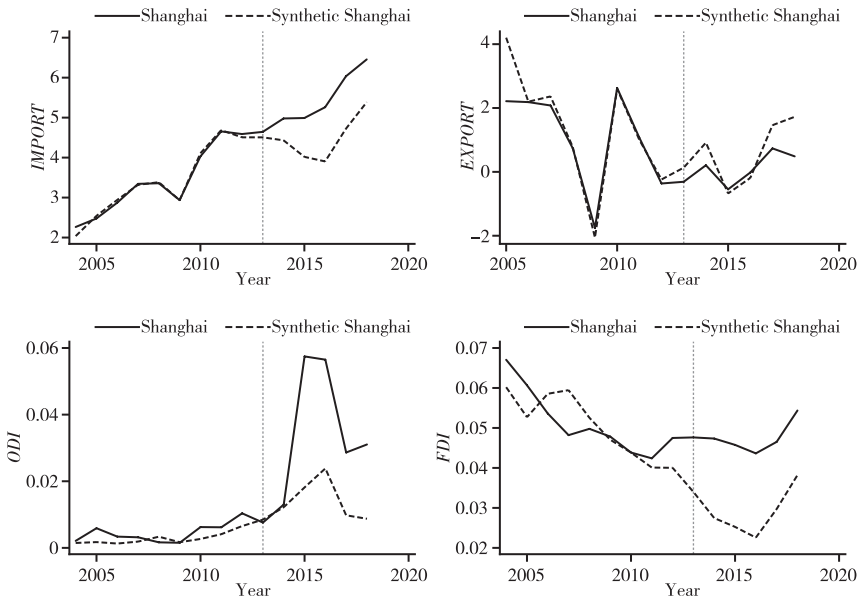


Figure 1. Comparison of Shanghai and Synthetic Shanghai in *IMPORT*, *EXPORT*, *ODI* and *FDI*

Figure 1 takes Shanghai as an example to test the impact of setting up FTZs on local *IMPORT*, *EXPORT*, *ODI* and *FDI* through synthetic control.¹ As illustrated, the vertical dotted line is the year when Shanghai FTZ is set up. In general, Shanghai and synthetic Shanghai are quite close in value of the four indicators before Shanghai FTZ is established and maintain the consistent trend of change, indicating that the two are highly fitted with an admirable fitting effect. In order to more vividly compare the difference between Shanghai and synthetic Shanghai in the indicators, this study calculates the average treatment effect of the two, with the result shown in Figure 2. The horizontal dotted line is the horizontal datum line (0). It's clear that *IMPORT* and *ODI* both fluctuate around the horizontal line before Shanghai FTZ is set up and show no trend of development, but after the FTZ is established, the two indicators have their difference gradually widened and show an apparent trend of development. Such a result more visibly displays the influence of FTZ establishment on Shanghai. This empirical result is consistent with the test result of mediating effect, indicating the FTZ does promote the growth of *ODI* and *IMPORT* in Shanghai, but poses insignificant influence on *FDI*. Besides, though the average treatment effect of *EXPORT* is negative, in terms of its development trend, *EXPORT* shows an obvious trend of fast rising after Shanghai FTZ is set up, but the trend is gradually weakened and turns into negative after the second batch (2015) and the third batch (2017) of FTZs are established. Export competition from other FTZs is probably a main reason behind the change.

¹ Because of the limited space, this paper only exhibits the synthetic control result of Shanghai FTZ. The result of other FTZs is available from the authors.

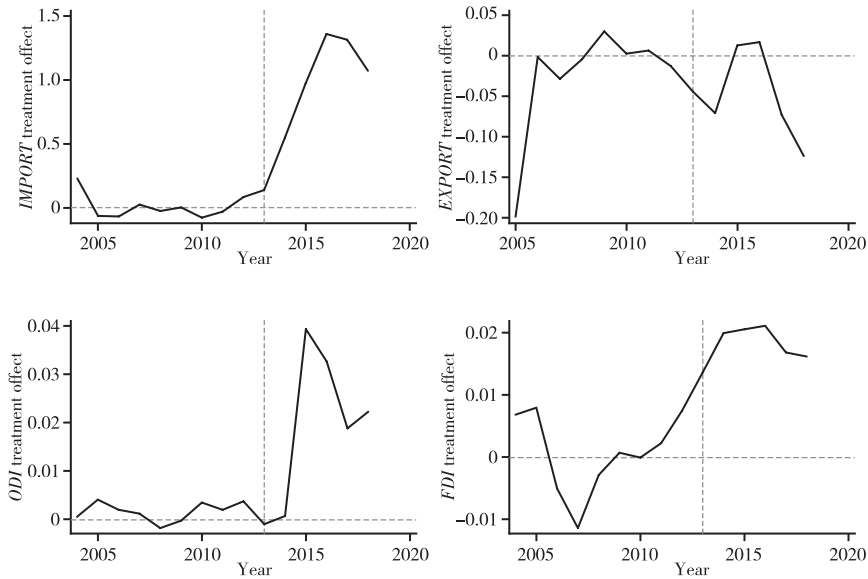


Figure 2. Difference between Shanghai and Synthetic Shanghai in the Indicators

Similarly, this study further evaluates the policy effect of other FTZs in the first three batches respectively and calculates ATT to verify the difference of FTZs in investment and trade. The specific empirical result is listed in Table 7 and Table 8.

Table 8. Provincial and Synthetic Provincial Average Treatment Effect (By Location)

Average treatment effect	Coastal FTZ						Inland FTZ				
	Shanghai	Tianjin	Guangdong	Fujian	Zhejiang	Liaoning	Sichuan	Hubei	Henan	Chongqing	Shaanxi
<i>FDI</i>	0.018	0.022	−0.015	−0.001	−0.006	−0.016*	−0.010	−0.0002	−0.002	−0.030*	0.002
<i>ODI</i>	0.019*	0.015*	−0.0001	0.003	0.009*	−0.001	−0.0005	−0.0002	0.001	0.007	0
<i>IMPORT</i>	0.900*	0.075	2.382*	0.225	0.068*	0.205	0.156	−0.0196	−0.101	0.202*	0.058
<i>EXPORT</i>	−0.617	−0.010	5.625*	−0.029	0.591*	−0.214*	0.102	0.134	0.243	0.124	0.409

Note: Average treatment effect is the mean value of all the treatment effects from the period when FTZs are established to the last period of observed value. * means related economic variables corresponding to the treatment areas pass the placebo test, and the detailed testing method and process are explained later in the study.

According to Table 7, regarding the batch heterogeneity, among the second batch of FTZs, the policy of setting up FTZs exerts insignificant influence over investment and trade of Fujian. It plays a significant driving role for ODI in Tianjin and also an obvious promoting role for import and export in Guangdong, with their average treatment effect reported at 2.382 and 5.625 respectively, the highest among all the FTZs. In line with the development realities of Guangzhou FTZ, which is positioned as “one city and three centers” and intended to build Guangzhou into an international shipping and trade center, the empirical result indicates that the policy effect is

noticeable. Based on the influencing effect of FTZs on Tianjin and Guangzhou, the result also proves the gained experience on FTZ development that FTZs located in areas protruding from the mainland have better effect on goods trade than those located in areas concave from the mainland. Tianjin FTZ has greater influence on *ODI*, showing it has done a better job in designing and implementing policies on financial reform and investment facilitation. Among the third batch of FTZs, the policy of setting up FTZs has insignificant influence on investment and trade of Sichuan, Hubei, Henan and Shaanxi, which all sit in economically less-developed inland areas in middle and western China, with poor policy effect. Among the inland cities, Chongqing FTZ has effectively promoted local import, with the average treatment effect registered at 0.202, meaning Chongqing FTZ has a better policy effect than other inland FTZs. As for the reason, in recent years, Chongqing FTZ has been committed to the core objective of setting up FTZs, i.e. to align to high-standard international investment and trade criteria, and takes exploring and making international land trade rules as one of the core reform tasks. Its development result is consistent with the analysis of conducting mechanisms in this study. The FTZ in Zhejiang shows an average treatment effect of 0.009, 0.068 and 0.591 on local *ODI*, *IMPORT* and *EXPORT* respectively, and plays an important driving role on the development of investment and trade in the province. Zhejiang FTZ has developed rich experience as reference for other areas. As China's only pilot FTZ consisting of land area and marine anchorage, it closely follows the core objective of facilitating investment and trade since the very beginning, priorities the investment facilitation and trade liberalization of commodities centered on the oil and gas industrial chain, and develops its own characteristics, putting into full play the driving role of FTZs on regional economic growth.

According to Table 8, generally speaking, coastal FTZs perform better in the dynamic mechanisms of driving economic growth, which is especially reflected in the three channels of *ODI*, *IMPORT* and *EXPORT*, while their inland counterparts perform poorly in the mechanisms, with only Chongqing FTZ showing due positive effect on *IMPORT*. The result is consistent with the above-mentioned driving effect of FTZs on economy, i.e. coastal FTZs have obvious driving effect on regional economic growth, while inland ones have insignificant policy effect. It's worth noticing that in both coastal and inland FTZs and FTZs of all the batches, the study finds the channel of FDI remains insignificant and even shows negative effect, which needs to be studied in depth by associating with the development status of FTZs and economic and social progress in China. Though FTZs are centered on institutional innovation, in reality, micro-innovation in the FTZ development takes up a larger part, but underlying reforms are rare to see. For instance, except for Shanghai that took the lead in FT account (2014) and facilitated financial account opening-up and capital account convertibility, other FTZs rarely launched any institutional or mechanism reform that could truly enable the free two-way flow of cross-border capital. Though Hainan

and Tianjin have launched the FT account,¹ the development has just started and still takes time to show result. Therefore, FTZs need to build up a business environment appealing to foreign investment and further improve their “soft power”. If growth of *ODI* in FTZs is mainly driven by policy, growth of *FDI* relies more on strong “soft power”, i.e. greater centripetal force for foreign investment through reform and innovation in various systems and mechanisms. This explains why the channel of *FDI* stays invisible and even shows negative effect. Such research result also tells us that currently, development of FTZs in China should focus on in-depth financial reform, especially explorations in financial account opening-up and capital account convertibility, and should not neglect the building of soft power.

5. Conclusions and Policy Suggestions

5.1. *Returning to the Origin of Free Trade and Building Pilot FTZs up to High Standards*

The original aspiration of setting up FTZs is to align to high-standard international investment and trade rules and realize replicability and scalability of institutional innovation. This study has already proved investment and trade to be an important driver for FTZs to promote regional economic growth. But in reality, the driving effect of some FTZs on local investment and trade is not up to expectations. This requires us to return to the origin of establishing FTZs and make great efforts in aligning to high-standard international investment and trade rules. First, the negative list system should be popularized. Other FTZs should refer to the experience of Shanghai FTZ to put into place the negative list system customized to local conditions as soon as possible, considerably relax market access, lower and even remove restrictions on ratio of shareholding by foreign enterprises, and promote the concept of “all is permissible unless prohibited” to become a consensus for FTZ development. Second, it’s important to actively align to international economic and trade rules. FTZ administration committees or related investment and trade committees should be set at the organizational level, and efforts should be made to simplify administrative approval procedures, reform backward ways of regulation, align to current international economic and trade rules, and develop an investment and trade legal system that both complies with the FTZ development reality in China and integrates into international rules. Besides, developing trade in services should be placed at a more salient position.

¹ On January 1, 2019, free trade account (FT account) was launched in Hainan. Currently, five banks in Hainan, including Bank of China, SPD Bank, ICBC, China Everbright Bank and Industrial Bank, run FT business. On November 26, 2019, China Merchants Bank Tianjin Branch was approved to access the FT account system by the People’s Bank of China, signaling that the FT account system officially landed in Tianjin and banks could handle related business. Tianjin became the third area to launch the FT account system after Shanghai and Hainan.

In the previous institutional reforms, the FTZs in China paid closer attention to goods trade, while opening-up of services and development of trade in services lagged behind. On this account, looking forward, it's necessary to open services wider to the outside, prioritize development of trade in services in the development of FTZs, integrate financial technology into FTZ development, and resort to digital economy to improve tradability of services.

5.2. Granting More Powers to FTZs to Conduct Reform and Exploring Differentiated Development Modes for FTZs of Varied Types

As analyzed above, the policy effect of coastal FTZs is significantly better than that of inland FTZs, which is related partially to the local economic foundation and geographic location and partially to the institutional design of the FTZs. FTZs should continue to deepen reforms and innovation, make differentiated explorations, set reform tasks with different features and priorities, identify their own development positioning and industrial characteristics, step up stress testing, and better play the role as the experimental field of reform and opening up. First, FTZs should be granted more powers to conduct reform. As the early and pilot experimental field for institutional innovation, FTZs should have government that is more like a “night watcher”, rather than a “referee”. Only when they are truly granted the power to conduct reform, their passion for innovation can be concretely stimulated and institutional obstacles in the way of exploring differentiated development modes for different FTZs can be removed. Second, “one size fits all” must be avoided when experience is promoted and replicated. Each FTZ has unique resource endowment and advantageous conditions and should customize others' experience to local conditions. When introducing suitable methods and modes, they should pay greater attention to their primary institutional innovation.

5.3. Opening the Finance Wider and Actively Searching the Paths to Financial Liberalization

FTZs, as the bridgehead of China in pursuing a new pattern of opening-up on all fronts, naturally provide the experimental field for opening up finance wider to the outside. However, empirical analysis finds that the channel of FDI in FTZs generally fails and the channel of ODI does not exert the due policy effect in inland FTZs, either. On such basis, FTZs should further enhance the financial system reform. First, they should primarily explore capital account opening-up represented by FT account. As an important institutional carrier for opening finance wider, FT account offers facilitation for FTZs to progressively open up capital account. FT account can not only effectively promote the two-way free flow of cross-border capital, but also shape a natural “electronic virtual fence” with its institutional design of “the borderline being fully

opened up and the line between FTZs and domestic areas being efficiently managed”, offering guarantee for effectively controlling the short-term abnormal cross-border capital impact. More domestic and foreign financial institutions should be permitted to set up FT account and FTU, and use of FT account should be further popularized. Second, the paths to financial liberalization should be explored. Historical experience indicates that progressive financial liberalization can stimulate the vigor of economic development and offer capital support for social development. FTZs should promote marketization of interest rate and exchange rate and opening-up of capital account in a coordinated manner. Under the precondition of controllable financial risks, efforts should be made to build up the FTZ offshore financial market to lay the foundation for RMB internationalization. At last, FTZ brand in integrated soft power should be greatly developed. If ODI is policy-driven capital flow, FDI relies more on great soft power of FTZs. In the future, FTZs should deepen the institutional innovation in personnel exchange, information service and legal service, build business environment with the most standardized management, most efficient service and lowest integrated cost, and gradually form the primary magnetic field attracting external quality capital, thus securing the high-quality development of pilot FTZs up to high standards.

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