Research Article

A Study of the Policy Effects of Beijing-Tianjin-Hebei Synergistic Development Strategy on Regional Financial Development: Based on the Synthetic Control Method

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The Beijing-Tianjin-Hebei (BTH) synergistic development strategy is an important initiative proposed by China to achieve sustainable regional development in order to reduce regional development disparities. Based on the synthetic control method, this article constructs a quasi-natural experiment using Chinese panel data from 2006 to 2020 to empirically test the impact of the event of BTH cooperative development as a national strategy on the financial development of the BTH region in China. It assesses the policy effects of the strategy on three dimensions of financial development as follows: scale, structure, and efficiency. The results of the study show that BTH synergistic development strategy has a positive effect on the scale of finance and effectively controls the financial liquidity risk in the region but has no significant effect on the optimisation of the financial structure. Therefore, it is necessary to take the sustainable development of the region as the premise to continuously promote the BTH regional synergistic development strategy, reduce the difference in financial scale development in the region, construct a financial efficiency evaluation mechanism, optimise the regional financial structure, and finally, achieve the goal of regional financial synergy and regional sustainable development.

1. Introduction

Synergy theory assumes that within the same unified body, if the development goals are the same, there is a possibility for the realisation of synergistic development, which leads to sustainable development [1]. Rauch proposed the concept of "regional economic synergy development" in 2009 based on synergy theory [2]. Regional development is a means for countries to manage regionalisation and achieve sustainable development [3, 4]. Regional economic synergy is the main trend of global economic development, the core of economic globalisation, and very important for achieving global sustainable development [5, 6]. Currently, most countries use regional financial support (i.e., reducing the application cost of borrowed funds) to enhance the long-term competitiveness of regional economies and achieve sustainable regional economic growth and sustainable regional

development [7]. Conversely, the depth of regional finance increases with economic growth (i.e., there is a strong feedback effect of regional finance on regional economic growth) [8]. There is a closely linked and mutually influential relationship between the synergistic development of regional economies and regional financial development. This relationship is manifested by the increasingly obvious role of market-based external financing along with the improvement of regional financial development [9], which is conducive to the accumulation of capital savings, the opening of regional financial capital credit channels, and the reduction of intraregional financing constraints [10]. This allows the integrated development of regional finance, which in turn promotes regional economic development and shows synergy. Finance can also provide a strong guarantee for sustainable regional development by promoting economic growth and reducing poverty [11]. Regional financial

dilemmas [12], credit risks [13], and a high inflationary environment within the region [14] will greatly weaken the positive impact of finance on the macroeconomy within the region, which in turn will lead to financial fragmentation, especially in countries with underdeveloped financial markets.

Since China's reform and opening-up, China's economy has developed rapidly and its financial industry has made remarkable progress. However, China is a vast country with obvious characteristics of regional economic development differences, and there are still shortcomings, such as uneven regional development and large differences in the number of financial resources and resource allocation efficiency [15], which are not conducive to sustainable regional development. Therefore, based on the current situation of China's economic development, making decisions on regional development strategies based on each region's endowment advantages and focusing on the subjective dynamics of regional finance and regional economic development will be important paths for China's sustainable economic development [16]. A series of regional integration policies based on the strategic framework of regional synergistic development guide formal or informal institutional cooperation and serve as a spatial blueprint for sustainable regional development [17]. China has now proposed several regional economic development visions and implemented a series of regional development strategies, such as the Western Development Strategy [18], the Yangtze River Economic Belt Development [19], the Guangdong-Hong Kong-Macao Greater Bay Area Construction [20], and the BTH synergistic development [21]. Studies have shown that regional synergistic development strategies are conducive to enhancing economic ties within urban agglomerations [17], upgrading regional industrial structures, breaking down administrative barriers within regions [22], optimising spatial structures, and promoting optimal allocation and free flow of production factors within regions [23]. Regional synergistic development strategies proposed based on urban agglomeration are considered an effective way to integrate regional development advantages and are a necessary condition for sustainable regional development [24]. The specific manifestation of finance is that the regional synergistic development strategy can further support the circulation channels of regional financial resources and enhance financial links between cities in the region [25]. In addition, a sustained and stable financial environment is also more conducive to the sustainability of corporate green technology innovation [26].

Currently, the study of the policy effects of regional development strategies has become the focus of scholars studying urban development. The synthetic control method provides a solution to the problem of endogenous bias (one or more explanatory variables in the model are correlated with the error term) in traditional empirical methods of regional development strategy implementation and can effectively control selectivity bias. At the same time, it can construct a "counterfactual" control group by using the weighted average of data from other provinces and cities to obtain the net effect of implementing regional development

strategies. Therefore, the synthetic control method has been widely used to assess the policy effects of public policies, such as South African's tobacco control policy [27], China's pilot free trade zone policy [28], and tax system reform in Eastern and Western European [29] and Romania's regional fiscal policy [30]. As one of the three major national strategies in China at present, the study of the policy effects of the BTH cooperative development strategy has received much attention from scholars. Zhang et al. (2020) evaluated the policy effects of the BTH cooperative development strategy on the economy and environment of Hebei province, and the results of the study showed that the implementation of the strategy improved the environment of Hebei province and optimised industrial structure; however, the impact on the Gross Domestic Product (GDP) growth rate of Hebei province was not significant [31]. The economic effects of the BTH cooperative development strategy on the whole region were assessed by Dai (2019) using the synthetic control method, which concluded that cooperation between Beijing, Tianjin, and Hebei gained new development momentum [32]. Most existing studies on the policy effects of the BTH synergistic development strategy select a particular policy for analysis within the framework of the BTH synergistic development strategy [33], and few are studies on the policy effects of the strategy for the BTH region as a whole.

In recent years, the implementation of the BTH cooperative development strategy has been effective. In the field of regional financial development, the efficiency of capital financing and resource allocation has been significantly improved, the financial market is running smoothly, and the suitability and fit between finance and the economy have been significantly improved. This article will focus on questions such as what kind of policy effect has the incorporation of BTH cooperative development into a national strategy had on regional financial development and what are the trends of financial scale, financial efficiency, and financial structure in the BTH region during the implementation of the synergistic development strategy. This article will conduct an overall quantitative policy effect study based on the synthetic control method f BTH synergistic development was elevated to a national strategy in 2014 and further propose policy recommendations for optimising regional financial development using the BTH synergistic development strategy as an opportunity. The objectives of this article are as follows: (1) To review the historical context of the BTH collaborative development strategy and to quantify the policy effects of BTH collaborative development being incorporated into a national strategy on the financial development of the BTH region. (2) To focus on the study of the interaction between regional economic development and regional financial development, to enrich the study of the policy effects of the regional development strategy, and to provide theoretical evidence for future policy adjustments in the BTH region. (3) To explore the intrinsic link between the financial integration of Beijing-Tianjin-Hebei region and regional synergy and whether the fit between Beijing-Tianjin-Hebei regional economy and finance has been further enhanced with the continuous promotion of Beijing-Tianjin-Hebei cooperative development strategy. This article

is structured as follows: Section 2 details the historical lineage and research hypotheses of the research region and BTH synergistic development strategy; Section 3 details the research methodology and data selection; Section 4 introduces and analyses the research results based on the synthetic control method; Section 5 details the test analysis of the empirical results; and Section 6 further summarises the article's findings and puts forward policy recommendations.

2. Research Background and Research Hypothesis

2.1. The Historical Context of the BTH Synergistic Development Strategy. The BTH region, as the "China's capital economic circle," is the largest and most dynamic economic region in northern China, as well as the political center and the third-largest economy in China [34]. The region is geographically advantageous and includes two municipalities, namely, Beijing and Tianjin, and 11 prefecture-level cities, namely, Shijiazhuang, Tangshan, Qinhuangdao, Handan, Xingtai, Baoding, Zhangjiakou, Chengde, Cangzhou, Langfang, and Hengshui (see Figure 1). Since 2011, when the national 12th Five-Year Plan proposed "promoting the integration of BTH," the regional economic agglomeration effect has become increasingly obvious and the sustainability of regional development has been gradually highlighted. After the introduction of the BTH Cooperative Development Planning Outline in 2015 and the establishment of China National New District (Xiongan New Area) in 2017, the sustainable development of the region entered the fast lane.

As one of the three major national strategies in China, BTH synergistic development has been continuously explored in the reform and innovation of regional development institutions and mechanisms, as well as the optimal layout of city cluster development, and actively practised in the construction of ecological civilisation and the coordinated development of population, economy, resources, and environment, gradually forming a new pattern of regional spatial development in BTH and steadily promoting the sustainable development of the region with complementary advantages and win-win synergy.

The BTH region is the "third growth pole" of China's economy; its regional economic cooperation dates back to 1986 and has undergone a long development process (see Figures 2 and 3). The BTH cooperative development strategy was elevated to a national strategy in 2014, and BTH regional cooperation has become greater in economic, industrial, transportation, logistic, and ecological aspects. Relevant government departments of the three regions have issued a series of regional cooperation documents to deepen economic cooperation, optimise the spatial allocation of resources, explore new modes of regional economic development, and promote BTH regional synergistic and sustainable development.

The results of the BTH synergistic development mainly show transportation synergy, industrial synergy, ecological synergy, and financial synergy. After 2014, the BHT region interconnected transportation integration has been realised. The industrial transfer cooperation among the three cities

has been continuously promoted, the positioning of the dislocation development has become clearer, and the industrial chain has been smooth and complete. The long-term environmental protection mechanism has been gradually established, and energy-saving and emission reduction tasks are progressing smoothly. In terms of financial synergistic development, the BTH region took advantage of the Tianjin Pilot-Free Trade Zone established in 2015 to explore and carry out regional financial development reform and innovation and to build a theoretical framework and practical experience base for regional financial development. In 2018, the financial departments of Beijing, Tianjin, and Hebei signed the framework agreement on cooperation among the financial bureaus (offices) of Beijing, Tianjin, and Hebei and jointly established a regional financial risk joint prevention and control mechanism. According to the Beijing, Tianjin, and Hebei financial function positioning of the three cities, it has accelerated the development of financial market synergy and continued to deepen financial cooperation. At the end of 2018, the Beijing banking industry supported the coordinated development of the Beijing, Tianjin, and Hebei financial balances exceeding one trillion yuan, reaching 1011.082-billion-yuan, year-on-year growth of 20.63%. At of the end of 2021, Hebei province, which includes 28,853 legal entities, undertook the transfer of Beijing and Tianjin's 11,385 industrial units of activity to optimise the industrial structure of Beijing, Tianjin, and Hebei.

2.2. Mechanisms and Research Hypotheses on the Role of Synergistic Development Strategy in Regional Financial Development. Regional finance is a key element of regional economic development and a core force for sustainable regional development. How to maximise the policy effect of a regional synergistic development strategy and whether the policy implementation has promoted regional financial development have become the focus of policy evaluation. Based on the above literature review and analysis, this article proposes the following research hypotheses.

Hypothesis 1. The BTH cooperative development strategy promotes regional financial development, and there is a certain degree of positive impact.

In the past development process of the BTH region, the economic development levels of BTH differed greatly; the industries of the three regions were homogeneous; the allocation of production factor resources was not efficient; and the regional industrial structure was in urgent need of optimisation, transformation, and upgrading [35]. Under the framework of regional synergistic development, the governments of Beijing, Tianjin, and Hebei were prompted to take more consistent steps in the formulation of economic and financial industrial positioning and other related policies that result in synergistic effects. Since the strategy of BTH cooperative development was elevated to a national strategy, the banking departments of BTH have signed financial-related policies such as the Agreement on Strategic Cooperation for the Integration of Financial Services in BTH, the Memorandum of Cooperation on Development
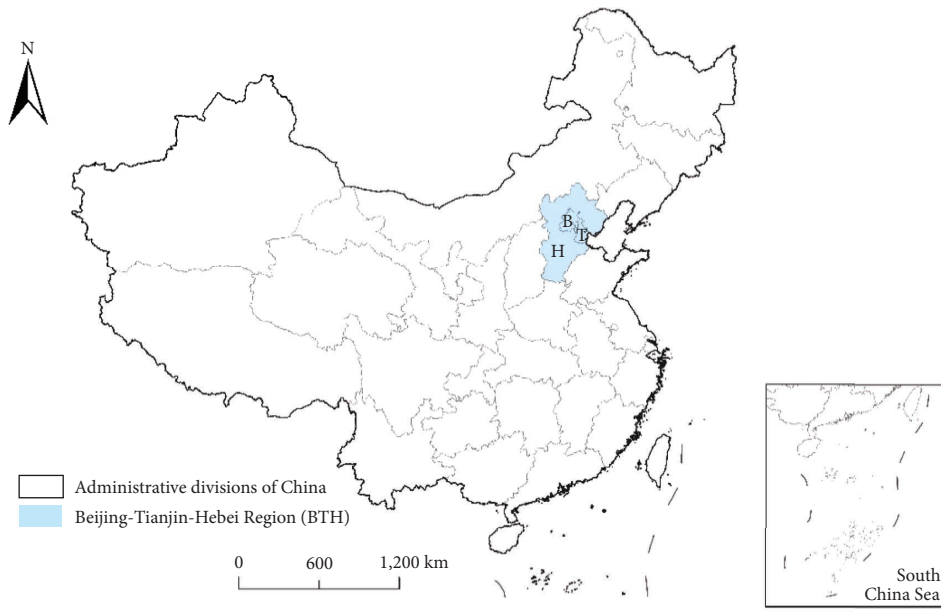
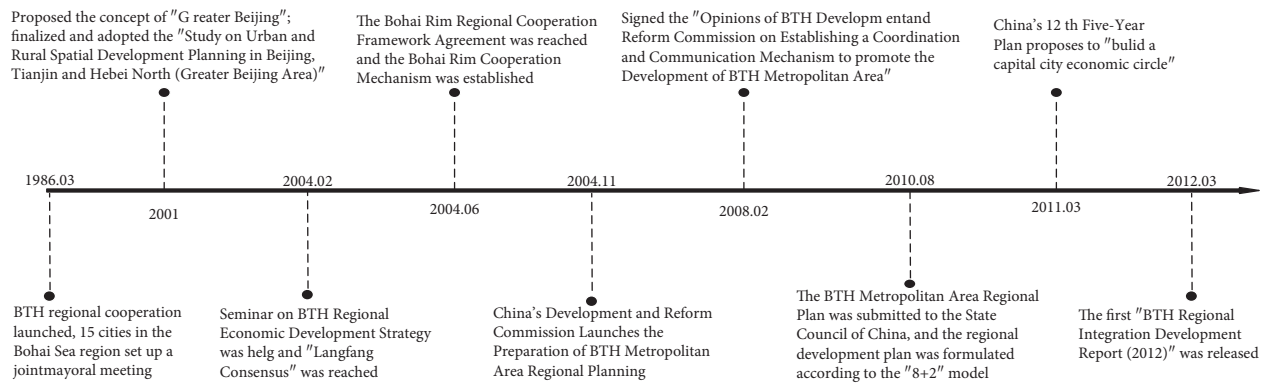FIGURE 1: Geographical location of the BTH region in China.

FIGURE 2: History of BTH synergistic development (before 2014).

FIGURE 3: History of BTH synergistic development (after 2014).

Finance to Support BTH Cooperative Development, and the Framework Agreement on Strategic Cooperation in Financial Services for BTH Cooperative Development. These policies are conducive to reducing the financial resources circulation barriers in the BTH region, optimising the spatial allocation of regional financial resources in the BTH region and ensuring the further development of regional finance of BHT region through top-level design. At the same time, in the process of BTH cooperative development, with the policy coordination of the government departments of the three regions, industrial development plans are formulated according to the characteristics of each city in the region,

complementary development of advantageous industries, implementation of industrial transfer, and the formation of a reasonable development structure of spatial patterns [36]. The virtuous competition for regional economic development improves the efficiency of regional financial capital allocation and thus improves regional financial development.

Hypothesis 2. The BTH cooperative development strategy harms regional financial development.

Since the BTH cooperative development strategy was elevated to a national strategy, the regional economic development level has improved to a certain extent, as evidenced by the increase in the urbanisation rate in the BTH region, which is higher than the national average. However, at the same time, the regional differences between Beijing, Tianjin, and Hebei have expanded, and the "siphonic effect" between Beijing and Tianjin is strong, leading to the continued flow of high-quality factor resources in Hebei to Beijing and Tianjin, and the outflow of talent and capital from Hebei, so the problem of the poverty belt around Beijing and Tianjin needs to be solved urgently [37]. Although the regional cooperative development strategy has strengthened the exchanges and cooperation among the three governments, administrative divisions and local interests will still lead to financial fragmentation, financial exclusion, and financial competition in the BTH region [38].

Hypothesis 3. There is no policy effect of the BTH cooperative development strategy on regional financial development.

The differences in the level of economic development within the region include financial differences, and there is a huge difference in the level of financial development between Beijing, Tianjin, and Hebei and differences in financial development goals. There are still problems, such as large regional disparities, obvious shortcomings in industrial collaboration, environmental regulations, land use planning differences, different financial systems, and insufficient financial interest drive in the region [39, 40]. In addition, the industrial structure of Hebei province has a large proportion of traditional industries, and it takes some time for economic adjustment and transformation, so financial infrastructure and financial innovation are lagging [41]. At the same time, there is an unavoidable time lag in the implementation of the BTH synergistic development strategy and synergistic policies, so there is no policy effect of the BTH synergistic development strategy on regional financial development.

3. Research Design

3.1. Research Methodology. The synthetic control method is a common method for assessing the effects of policies and the impact of major events and is widely used for social science causality inference for certain important measures or events. Abadie and Gardeazabal (2003) first applied the synthetic control method to the economic impact of terrorist activities in the Basque country of Spain [42]. Abadie et al.

(2010) conducted an additional statistical study to provide rigorous theoretical proof of the synthetic control method [43]. The synthetic control method has a wider scope of application, to some extent, compared to other policy evaluation methods, such as the double-difference method (DID) and DID based on propensity score matching, under which the assumptions for control and experimental groups are more demanding and the selected control group is subjective and arbitrary. The synthetic control method can estimate the optimal weights closest to the condition of experimental group by weighting multiple control units through statistical data and synthesize a control group with the characteristics of the experimental group. Based on this, further counterfactual analysis was conducted to compare the impact of different assessments between the experimental group and the synthetic control group after policy implementation. The treatment implementation effect of the policy was studied using the difference between the two. The synthetic control method was conducted with positive weights and a sum of weights of 1, which clearly showed the differences and similarities between the experimental group and the synthetic control group before the policy implementation to avoid errors and improve accuracy.

In this article, we adopt the synthetic control method, using the BTH region, where the BTH cooperative development strategy was implemented, as the experimental group, and other Chinese provinces (municipalities directly under the central government), which are not affected by the policy, as the control group. First, we find the appropriate weights for the explanatory variables through the synthetic control method, and then we weigh the provinces and cities in the control group to construct a "synthetic BTH." Based on the above research method, the theoretical derivation and model setting of this article are as follows:

Assume that the financial development of $1 + J$ regions is observed at time $t \in [1, T]$, where region i (this article refers to the BTH region) implements the BTH cooperative development strategy in period T_0 (2014) and $1 \leq T < T$, and the remaining J regions are not affected by this policy as the control group. The defined variable Φ_{it}^N denotes the financial development of region i in period t that is not affected by the policy, and Φ_{it}^I denotes the financial development of region i in period t after being affected by the policy. Here, $i = 1, 2, \ldots J + 1; t = 1, 2, \ldots T$. Set the model as follows:

$$\Phi_{it} = \Phi_{it}^N + D_{it}\alpha_{it}, \tag{1}$$

where D_{it} is a dummy variable for whether it is affected by the policy.

$$D_{it} = \begin{cases} 1, & i = 1 \text{ and } t > T_0, \\ 0, & \text{others.} \end{cases} \tag{2}$$

When $i = 1$ and $t > T_0$, $\alpha_{it} = \Phi_{it} - \Phi_{it}^N = \Phi_{it}^I - \Phi_{it}^N$, which is the policy effect. In reality, Φ_{it}^I is observable when $t > T_0$, but the counterfactual variable Φ_{it}^N is not directly observable, so the factor model proposed by Abadie et al. is referred to as estimate Φ_{it}^N:

$$\Phi_{it}^N = \delta_t + \beta_t X_i + \gamma_t u_i + \varepsilon_{it}, \tag{3}$$

where δ_t is the time fixed effect; X_i is the observable vector of region i, which is not affected by policy intervention and does not change over time; $\gamma_t u_i$ is the unobservable interaction fixed effect and ε_{it} denotes the unobservable disturbance fluctuation in region j in period t with a mean value of 0. We consider constructing the weight vector $W = (w_2, \ldots, w_{J+1})$, where $w_j \geq 0$ and satisfies $w_2 + \cdots + w_{J+1} = 1$. Different values of W can constitute different simulated regions of "synthetic BTH." Therefore, the resultant variables of the synthetic control region were obtained as follows:

$$\sum_{j=1}^{J+1} w_j \Phi_{jt} = \delta_t + \beta_t \sum_{j=1}^{J+1} w_j X_j + \gamma_t \sum_{j=1}^{J+1} w_j u_j + \sum_{j=1}^{J+1} w_j \varepsilon_{jt}. \tag{4}$$

If there exists $W^* = (w_2^*, \ldots, w_{J+1}^*)$ satisfying $\sum_{j+1} w_j^* \Phi_{j1} = \Phi_{11}$ and $\sum_{j+1} w_j^* \Phi_{jt} = \Phi_{1t}$ for any $t \in [1, T_0]$ T0, as long as $\sum_{t=1}^{T_0} \gamma_t' \gamma_t$ is a nonsingular matrix and has more prior values of control group, then Φ_{it}^N can be made infinitely close to $\sum_{J+1} w_j^* \Phi_{jt}$; when $t > T_0$, the two replace each other, and the unobservable Φ_{it}^N is replaced by the observable $\sum_{J+1} w_j^* \Phi_{jt}$ to obtain the policy effect generated $\hat{\alpha}_{1t}$ by the BTH synergistic development strategy.

$$\hat{\alpha}_{1t} = \Phi_{it}^N - \sum_{J+1} w_j^* \Phi_{jt}. \tag{5}$$

Obtaining W^* becomes the focus. In practical situations, it is difficult to have solutions in the data that make the system of equations consistently; therefore, the weight vector W^* and the synthetic control are determined by an approximate solution. W^* is determined by minimising the distance function $\|X_1 - X_0 W\|$ between X_0 and X_1. The distance function $\|X_1 - X_0 W\| = \sqrt{(X_1 - X_0 W)' V (X_1 - X_0 W)}$ is applied here, where V is a symmetric semipositive definite matrix, and the minimised average prediction error can be obtained while assigning weights to X_0 and X_1.

In this article, model estimation regarding the synthetic control method uses the Synth package in STATA 14.0 software [43].

3.2. Data Selection

3.2.1. *Variable Setting.* Regarding the research on the measurement of regional financial development levels, scholars have mostly assessed the characteristics and connotations of financial development quality from three dimensions as follows: financial scale, financial efficiency, and financial structure [44]. The expansion of financial scale is the main means of promoting economic development, but it should be kept moderate and aimed at reducing the operating costs of the real economy [45]. The regional financial structure needs to match the regional economic structure; otherwise, it will have a dampening effect on the regional economy [46].

Regional financial efficiency is an important indicator of whether finance better serves the real economy and is related to regional financial resource allocation [24]. In this article, three dimensions of financial development such as financial scale, financial efficiency, and financial structure are used as predictor variables of the synthetic control method, and important factors affecting regional financial development are selected as predictor control variables for synthetic control to assess the policy effects of BTH cooperative development strategy. The financial-related ratio is used as the predictor variable to reflect the scale of financial development, which is defined as the ratio of the value of regional financial assets to the value of physical assets [47]. The ratio of the sum of deposit and loan balances of regional financial institutions to the regional GDP is selected as its calculated value, considering financial data efficiency and China's development reality. The efficiency of financial development is expressed by the deposit-lending ratio, which is the ratio of regional financial institutions. The efficiency of financial development is expressed by the ratio of the loan balance at the end of the year to the deposit balance at the end of the year. The structure of financial development is expressed by the ratio of the loan balance at the end of the year of regional financial institutions to the regional GDP, and this ratio reflects whether banks play a leading role in regional financial development. Comprehensive domestic and international studies on regional financial development consider the representativeness of the data. The predictor control variables were selected from the economic, policy, and social environmental factors affecting regional financial development. The specific index system is shown in Table 1.

3.2.2. *Sample and Data Selection.* The data used in this article are Chinese provincial panel data based on the history of BTH regional synergistic development and regional financial development. The evaluation years were selected as a total of 15-years before and after the implementation of the BTH synergistic development strategy (2006–2020). The data sources are the China City Statistical Yearbook, the China Financial Yearbook, and the statistical yearbooks of each province (municipality directly under the central government) in previous years. The BTH region is taken as an independent policy implementation region in the study sample (i.e., the experimental group). Meanwhile, to ensure the consistency of political and economic systems, three regions, namely, Hong Kong, Macao, and Taiwan are excluded from the sample, and the excluded control group includes Shanxi, Liaoning, Jilin, Heilongjiang, Shanghai, Jiangsu, Zhejiang, Anhui, Fujian, Jiangxi, Shandong, Henan, Hubei, Hunan, Guangdong, Hainan, Sichuan, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, Chongqing, Guangxi, Inner Mongolia, Tibet, Ningxia, and Xinjiang, for a total of 28 regions. Descriptive statistics (as shown in Table 2) were first conducted for the study variables, and then a synthetic control method was applied to assess the policy effects of the BTH cooperative development strategy on the financial development of the region.

TABLE 1: The synthetic control method index system.

Indicator type	Measurement indicators	Indicator calculation method
Predictive variables	Financial scale	Year-end balance of deposits and loans of regional financial institutions/regional GDP
	Financial efficiency	Year-end balance of all loans/balance of all deposits of the regional financial institutions
	Financial structure	Year-end loan balances of the regional financial institutions/regional GDP
Predictive control variables	Economic growth	Total regional social fixed asset investment/regional GDP
	Economic structure	Regional tertiary sector value-added/regional GDP
	Policy interventions	Local government fiscal spending/regional GDP
	Resident consumption	Final consumption expenditure/expenditure method regional GDP

TABLE 2: Descriptive statistics of indicator data.

Indicator	Observation value	Mean value	Standard deviation	Minimum value	Maximum value
Financial scale	465	3.0641	1.1893	1.4005	8.1310
Financial efficiency	465	0.7523	0.1489	0.2327	1.1641
Financial structure	465	1.2967	0.4839	0.5528	3.0846
Economic growth	465	0.7362	0.2552	0.2099	1.5070
Economic structure	465	0.4493	0.0978	0.2862	0.8387
Policy interventions	465	0.2614	0.1952	0.0830	1.3792
Resident consumption	465	0.5159	0.0859	0.3410	0.8025

4. Empirical Results

4.1. Calculation and Comparison of the Weights of the Synthetic BTH Region. Based on the selected set of control provinces and cities and the data variables set in this article, the synthetic control method is used to constitute a "synthetic BTH region" as "counterfactual" and to conduct a comparative study with the "real BTH region." A comparative study was conducted. The weight composition of the three dimensions of financial development in the "synthetic BTH region," namely, financial scale, financial efficiency, and financial structure, is shown in Table 3. When the financial scale is used as the predictor variable in the "synthetic BTH region," there are four regions, namely, Liaoning, Shanghai, Yunnan, and Ningxia, and the region with the highest weight is Shanghai (0.450). When financial efficiency is used as the predictor variable, there are three regions, namely, Shanxi, Shanghai, and Guangdong, and the region with the highest weight is Guangdong (0.587). When financial structure is used as a predictor variable, six regions are represented, namely, Shanxi, Liaoning, Shanghai, Zhejiang, Hubei, and Guangdong, with the highest weight being Zhejiang (0.324). The weights of the other regions in the control group in the sample are all 0. In the fitting process, the regions that generate weights in the control group indicate a certain degree of similarity with the target BTH region. A certain degree of similarity and greater weight result in a higher similarity of the regions.

Table 4 provides a comparison of the predicted variables and predicted control variables for the BTH region and the synthetic BTH region before and after 2014. From the comparison of variables, it can be seen that the coefficients of the variables of real and synthetic BTH are closer, and the differences between the real and synthetic values of variables are smaller compared to the average values of each variable, which is a great improvement for counterfactual simulation than the average values. Therefore, it can be judged that synthetic BTH is a better fit for the economic characteristics and financial development of the BTH region before the specified time and is suitable for further analysis.

4.2. Analysis of the Policy Effects of the BTH Synergistic Development Strategy. Figures 4–6 show the synthetic results of the three dimensions of financial development in the BTH region, in which the vertical dashed line indicates the year when the BTH regional synergy strategy was elevated to a national strategy, and the difference between the dashed curve and the real curve based on the "counterfactual" after its elevation to a national strategy indicates the policy. The difference between the dashed curve and the solid curve based on the "counterfactual" strategy indicates the policy effect. Looking at the trends of the two curves before and after the vertical dashed line, we can conclude whether the synergistic strategy is effective and analyse the impact of the strategy on regional financial development. First, observing Figures 3–5, we find that the change trajectories of both the real BTH region and the synthetic BTH region imaginary and real curves are quite close to each other before the vertical dashed line, with no obvious difference and almost overlapping in trend changes, indicating that synthetic BTH and real BTH fit well in the three dimensions of financial scale, financial efficiency, and financial structure.

In terms of financial scale (Figure 4), there is a period of lag in the policy effect on the implementation of the BTH synergistic development strategy to a national strategy, and the regional financial scale is very similar, with no significant difference from 2014 to 2016. After 2016, the policy effect

TABLE 3: Synthetic BTH region: control group weights.

The three dimensions of financial development	Control group weights
Financial scale	Liaoning (0.109), Shanghai (0.450), Yunnan (0.331), Ningxia (0.110)
Financial efficiency	Shanxi (0.348), Shanghai (0.065), Guangdong (0.587)
Financial structure	Shanxi (0.059), Liaoning (0.317), Shanghai (0.223) Zhejiang (0.324), Hubei (0.039), Guangdong (0.037)

TABLE 4: Comparison of real and synthetic values of predictor variables.

| Indicator variables	Financial scale		Financial efficiency		Financial structure		Mean value
	Real value	Synthetic value	Real value	Synthetic value	Real value	Synthetic value	
Financial scale	4.2549	4.1050	—	—	—	—	2.9245
Financial efficiency	—	—	0.5947	0.6292	—	—	0.7584
Financial structure	—	—	—	—	1.5881	1.5860	1.2554
Economic growth	0.5463	0.5450	0.5463	0.4295	0.5463	0.5454	0.7513
Economic structure	0.4935	0.4738	0.4935	0.4292	0.4935	0.4380	0.4376
Policy interventions	0.1546	0.2396	0.1546	0.1528	0.1546	0.1563	0.2695
Resident consumption	0.4568	0.5460	0.4568	0.4808	0.4568	0.4607	0.5196
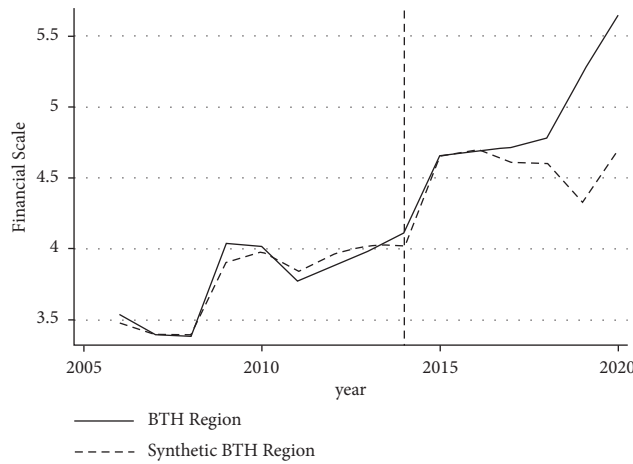
FIGURE 4: The BTH region and the synthetic BTH region's financial scale change trend.
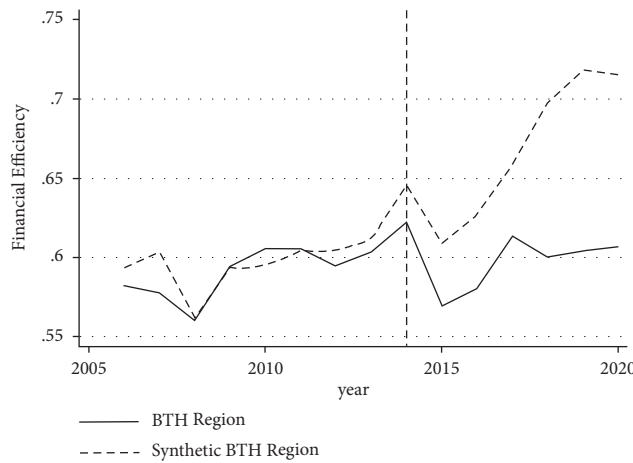

FIGURE 5: The BTH region and the synthetic BTH region's financial efficiency change trend.
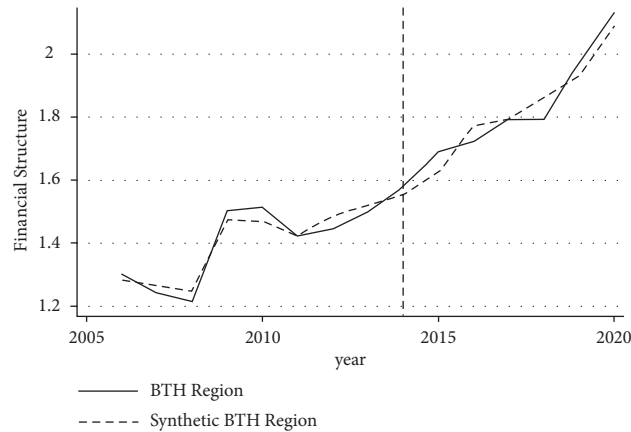
Figure 6: The BTH region and the synthetic BTH region's financial structure change trend.

revealed that the trend of the curve change between the actual BTH region and the synthetic BTH region gradually increased, and the financial scale of the actual BTH region far exceeded the financial scale of the synthetic BTH region with significant differences, indicating that the policy effect of the implementation of the BTH regional synergistic development strategy to a national strategy is positive and significantly promotes the development of the regional financial scale.

In this article, the indicator of the deposit-to-loan ratio is selected to indicate financial efficiency, which reflects the proportion of banking sector funds used for lending and in the size of lending capacity and has the role of regulating the scale of bank loans, curbing hyperinflation and measuring financial liquidity risk. Figure 5 demonstrates that the BTH synergistic development strategy becoming a national strategy significantly reduced the deposit-to-loan ratio, lowering it to about 57% in 2014–2015; it has since remained at about 60%, well below 75%. There is a significant difference between the actual and synthetic BTH region curves, with the deposit-to-loan ratio of the synthetic BTH region being much higher than that of the actual BTH region, indicating that the BTH synergistic development strategy has a positive effect on reducing regional financial liquidity risk, which is conducive to safeguarding the liquidity of regional banking loans, effectively regulating the money supply, controlling the loan size, and thus promoting stable and high-quality regional financial development. By analysing the synthetic control image of financial structure (see Figure 6), it can be found that the financial structure values of both the actual and synthetic BTH regions show an increasing trend after 2014, and the two curves are crossed and overlapped, with very similar financial structure values and no significant differences, indicating that the BTH cooperative development strategy has no significant policy effect on the regional financial structure and has not affected the regional financial structure.

5. Test of Empirical Results

Based on the empirical results, there is a certain degree of difference between the changes in financial development in the BTH region and the synthetic BTH region. To further determine whether the difference is a policy effect of implementing the BTH synergistic development strategy rather than a coincidental phenomenon or a statistical artefact, it is necessary to do a placebo test and sensitivity analysis on the empirical results to test the significance level of the impact of the BTH regional synergistic development strategy on regional financial development to ensure the robustness of the results.

5.1. Placebo Test. The results were first subjected to a placebo test [42], which is based on the basic idea of selecting a province or city that did not implement the BTH synergistic development strategy during the observed years as the treatment group, assume that the province or city implemented the same policy as the BTH region in the same years, apply the same synthetic control method to estimate the financial development change, and compare the difference in financial development change between this province and city and the synthetic control subject without policy implementation. If it is found that the difference in financial development changes in this province and city is the same as that of the BTH region, and the results obtained by the synthetic control method are random and unreliable and cannot prove the impact of the BTH regional cooperative development strategy on regional financial development; otherwise, the empirical results of this article are robust.

To this end, based on the results of regional weight calculation obtained in the empirical part, the synthetic control of Shanghai, which has a certain proportional weight in all three dimensions of financial development, is selected as the treatment group based on the similarity of the economic development levels of each province and city to Beijing, Tianjin, and Hebei, to test the policy effects of the BTH cooperative development strategy (see Figure 7). The results of the placebo test in Figure 7 indicate that the synthetic control images of financial scale and financial efficiency in Shanghai and synthetic Shanghai are significantly different from the synthetic control images of the BTH region in both dimensions in terms of trends and differences between the virtual and real curves and do not show the same trends and difference patterns as those in the
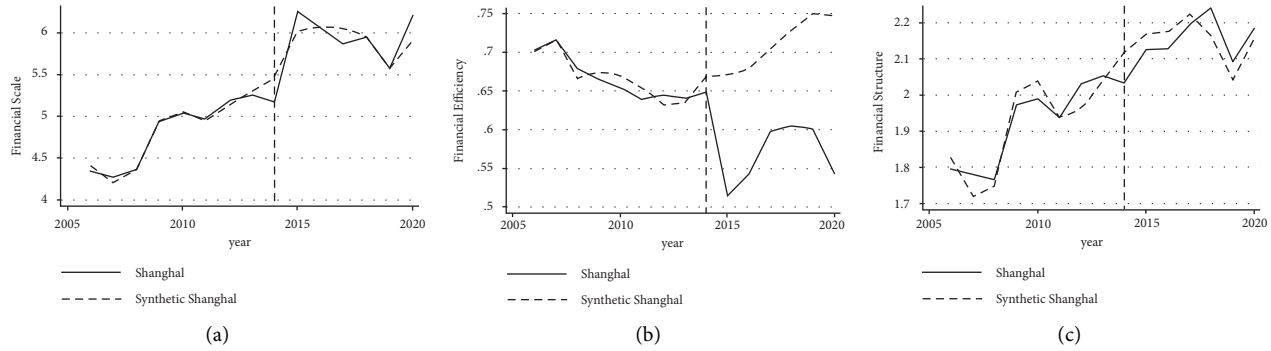
FIGURE 7: Placebo test: Shanghai and synthetic Shanghai. (a) Financial scale. (b) Financial efficiency. (c) Financial structure.

BTH region. Therefore, this test again illustrates that the implementation of regional synergistic development as a national strategy is an important reason for the expansion of the regional financial scale and the reduction of financial liquidity risk. As for the financial structure, the synthetic control images of the BTH region and Shanghai are relatively similar, both showing a crossover of two curves (virtual and real), with small differences and upward trends. The results of the placebo test are consistent with the conclusions of the above analysis (i.e., the policy effect of the implementation of regional synergistic development to a national strategy does not have a significant impact on the financial structure and does not produce any positive or negative effects).

5.2. Sensitivity Analysis Test. To further test whether there are other unobserved external factors in the variation in financial development in the BTH region, this article uses sensitivity analysis to determine whether other cities exhibit the same situation as the BTH region. The sensitivity analysis is constructed by eliminating one region through each repeated feedback process to test whether the policy effect of the implementation of the BTH regional cooperative development to a national strategy on the financial development of BTH is affected by the regions in the control group and whether the results are different due to the absence of any one city in the control group.

The results of the sensitivity analysis (see Figure 8) indicate that after removing any region within the control group, the synthetic image of financial scale and financial efficiency of financial development in the BTH region is consistent with the results before removal, while the synthetic image of financial structure has changed slightly. Figure 8(c) demonstrates that the fit is poor from 2011–2014 before the policy implementation node, thus leading to changes in the synthetic image after 2014. Overall, the experimental results do not vary with the control group of provinces and cities, which is consistent with previous findings and further proves the robustness of the results.

6. Conclusion

Based on the statistical panel data of 31 regions in China from 2006 to 2020, this article constructs a "counterfactual" object

synthetic BTH region as a quasi-natural experiment and compares it to and analyses it against the actual BTH region. The policy effects of this event on regional financial development are explored empirically by deconstructing the changes in regional financial development into three dimensions as follows: financial scale, financial efficiency, and financial structure. The synthetic control method is used to fit the actual BTH region with the synthetic BTH region before 2014, which provides good conditions for the analysis of policy effects of the strategy. The research results reveal that the implementation of BTH synergistic development as a national strategy has a positive policy effect on regional financial development in general, and the results are robust, but there is a time lag. Specifically, the gap between the actual and synthetic BTH curves began to widen in 2016. The implementation of regional synergistic development as a national strategy is beneficial to the expansion of the financial scale. The curve of regional financial efficiency is always below the synthetic BTH curve after 2014, indicating that the event is conducive to reducing regional financial liquidity risk and safeguarding regional financial stability. The financial structure is almost unaffected by the event, and the trends of the two curves of actual and synthetic BTH are very similar.

In response to these findings, the following policy recommendations are proposed:

First, policy synergy should be vigorously promoted to reduce regional financial scale development differences. The BTH synergistic development strategy is conducive to the integration of regional financial resources and has a positive contribution to the expansion of the regional financial scale. The synergistic development of regional finance needs to take the sustainable development of the region as a starting point, use top-level policy synergy as a focus, break the administrative divisions of Beijing, Tianjin, and Hebei, and use the existing financial scale advantages of Beijing and Tianjin to drive the development of Hebei, which has a smaller financial scale and slower development, enhance the radiation-driven effect, gradually reduce the development differences of financial scale in the region, and promote the development of the region. Synergistic development continuously improves the BTH synergistic governance framework and system and tilts the financial resources in the BTH region from areas with a larger financial scale to areas with a smaller financial scale to further optimise the spatial
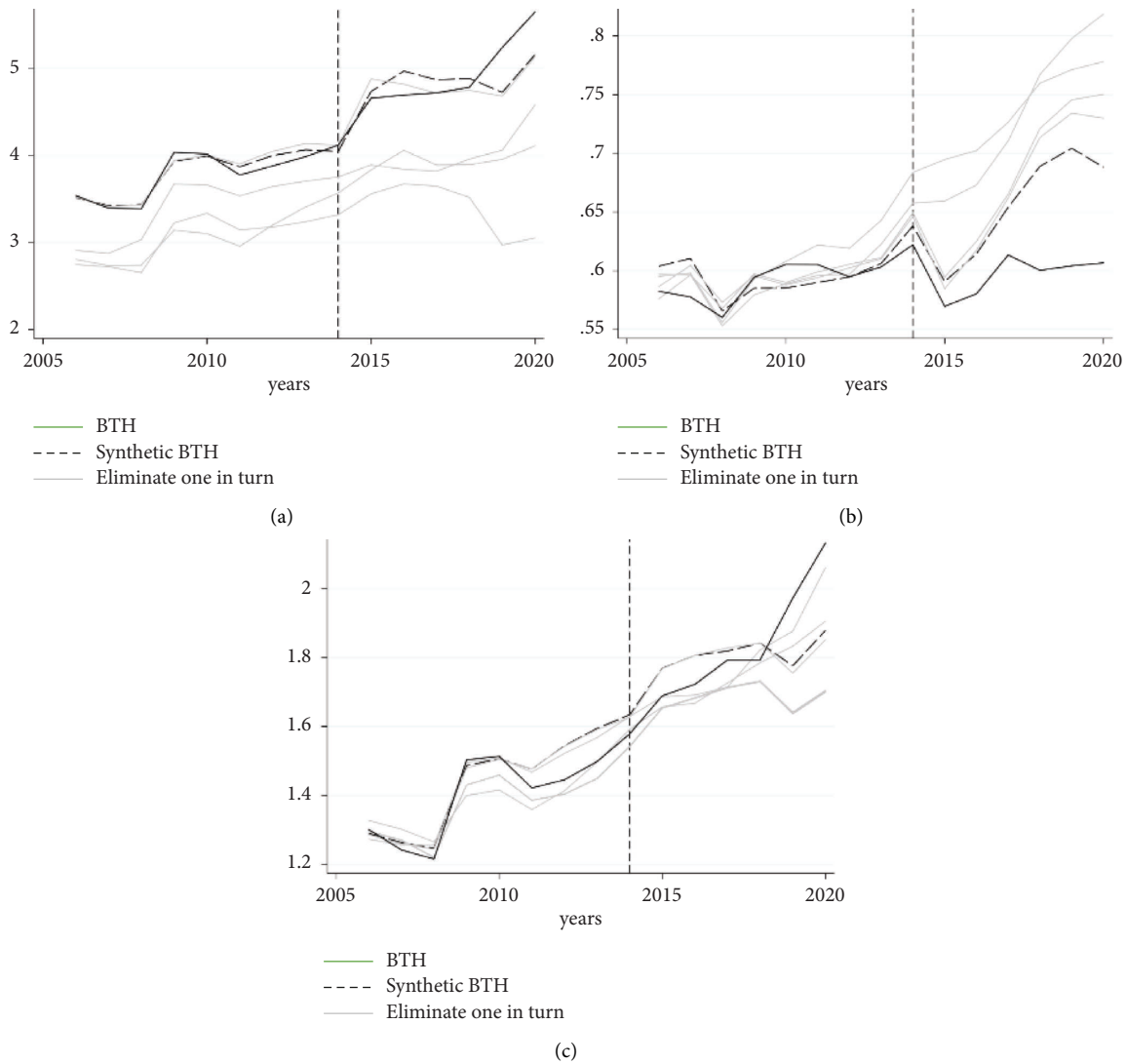
(a)

(b)

(c)

FIGURE 8: Sensitivity analysis: synthetic BTH for iterative removal of control group cities. (a) Financial scale. (b) Financial efficiency. (c) Financial structure.

allocation of financial resources and improve the mobility of production factors and financial resources in the region. The government departments of the three regions should guide the development of the regional financial scale and regulate the development of the overall regional financial scale according to the regional market and economic development and avoid causing excessive tilting of resources to the financial sector in the region.

The second recommendation is to build an active financial efficiency evaluation mechanism to prevent and resolve financial risks. The implementation of the BTH cooperative development strategy strengthened financial collaboration and mutual promotion among the three regions, broadened the circulation channels of regional financial resources, and caused improvement of regional financial efficiency. At the same time, new financial risks may arise in the process of regional financial cooperation, thus threatening the stability and enhancement of regional financial efficiency. Therefore, an evaluation mechanism of

financial development under the dual background of regional sustainable development and BTH synergy strategy should be established to normalise the stage of regional synergy and financial development evaluation, dynamically adjust regional financial development policies according to different development stages of regional synergy, maximise the avoidance of regional financial risks, and guarantee the enhancement of regional financial efficiency. At the same time, the Beijing-Tianjin-Hebei infrastructure synergy construction investment and the financing model, the establishment of a market-oriented infrastructure investment and financing platform, and the introduction of civil society capital should be reformed and innovated to maximise the reduction of financial risk [48].

Third, optimise the regional financial structure by optimising the regional industrial structures of Beijing, Tianjin, and Hebei and avoiding intersector competition. At present, the optimisation of the overall financial structure of the region by the BTH synergistic development strategy is

still not prominent. Therefore, Beijing, Tianjin, and Hebei should closely focus on regional sustainability and the BTH cooperative development strategy, develop industries according to their location advantages, and achieve regional financial structure optimisation with a reasonable regional industrial structure. A long-term mechanism for ecological compensation in the BTH region should be built and the proportion of regional financial credit resource structure should be adjusted to effectively promote Hebei to undertake Beijing-Tianjin industries, stimulate industrial cooperation, development, and innovation in the region, and avoid industrial homogenisation and inefficient competition in the region. At the same time, the government departments of Beijing, Tianjin, and Hebei should actively guide the development of regional financial structure in the direction of conforming to the regional economic structure adjustment, promote a reasonable and balanced regional financial asset allocation structure, make the financial structure conform to the trend of optimising the industrial structure of Beijing, Tianjin, and Hebei, enhance the overall competitiveness of Beijing, Tianjin, and Hebei, and promote the sustainable development of the region.

Data Availability

The data are available from the official website of the National Bureau of Statistics of China, China Urban Finance Yearbook, Beijing Statistical Yearbook, Tianjin Statistical Yearbook, Hebei Statistical Yearbook, and wind database.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Acknowledgments

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