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Will Rural Collective-Owned Commercial Construction Land Marketization Impact Local Governments' Interest Distribution? Evidence from Mainland China

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Abstract: To promote the harmonious human-land relationships and increased urban-rural interaction, rural collective-owned commercial construction land (RCOCCL) marketization reform in some pilot areas was a new attempt by the Chinese Central Government in 2015. In this areas, a novel interest distribution system was established with the land right adjustment and the corresponding local governments were likely to benefit through taxation and land appreciation adjustment fund. This study proposed the hypothesis that the RCOCCL marketization reform would improve local government revenue, and explored the actual effect based on panel census data of county-level administrative units from 2010 to 2018. We applied the difference-in-difference (DID) method to analyze the causal effect of this reform on fiscal revenue with 29 pilot areas selected as the treatment group and 1602 county-level units as the control group. The empirical results of the optimized DID robustness test models and the Heckman two-step method showed that the RCOCCL marketization reform does not have a significant impact because of lower land circulation efficiency, the transfer of land transaction costs, and the policy implementation deviations. Thus, weakening the administrative intervention of local governments in the RCOCCL marketization is essential to the land market development in China.

Keywords: rural collective-owned commercial construction land; land system reform; policy evaluation; interest distribution; China

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1. Introduction

To accommodate evolving human-land relationships, the land system must be subject to constant adjustment and reform, especially in areas with rapid urbanization. This has been widely observed in developing countries throughout the world in recent decades, such as South Africa, Central Asia, and South America [1–4]. Against the backdrop of worldwide rural reconstruction in recent years, the adjustment of rural land ownership has been fueled by massive alterations in state policies, which has led to whole-scale reformulation of productive practices [5]. China, one of the fastest growing economies with an expanding urban population, has a unique land system and rich experience in land system reform. The most notable feature of land system in Mainland China is the urban-rural dual structure land system, which separates land into state-owned land and rural collective-owned land [6]. Unlike the stability of the state-owned land system, China's rural land system has undergone several major reforms. The land ownership reform in 1962 established a three-level ownership system with land as the main body, that is, rural land belongs to rural residents' communes (*sanji suoyou dui wei danwei*, SSDWD). After the Reform and Opening-Up in 1978, the Chinese Central Government established a household contract responsibility system to separate rural land ownership from contract management

rights [7]. This system handed more land usufruct to rural residents and promoted farmers' production and land use efficiency. However, the urban-rural dual structure failed to protect rural residents' interests because the land expropriation system forced rural land to be transformed into state-owned land to enter the land market [8].

Therefore, it is necessary for the Chinese government to reform the land system and allow rural land to directly participate in the land market. The Ministry of Land and Resources selected 9 districts as pilot areas to implement rural collective-owned construction land circulation reform in 2000. This reform aimed to explore the marketization of all types of rural construction lands and various circulation methods. However, the pilot reform did expose several major problems. For example, lax land management led to the rapid growth of rural construction land scale, which threatened the preservation of cultivated land [9]. In 2008, the Central Committee of the Communist Party of China (CPC) raised several key issues for rural reform and development, which included stabilizing the household contractual management system and allowing rural collective construction land to participate in the land market with some constraints [10]. After that, the National New Urbanization Plan (2014–2020) of China stated that the main type of rural collective construction land involved in the land market is rural collective-owned commercial construction land (RCOCCL). In 2015, the Ministry of Natural Resources selected 33 counties in Mainland China, which covered almost all of the provinces, as policy pilot areas to test the RCOCCL marketization reform. As a representative reform method with Chinese characteristics, the policy pilot areas were allowed to advance the current land management legal system and were encouraged to adopt some innovative reform measures during a specific period.

The primary task of the governments in the pilot regions was to reorganize the land rights system to fulfill equal rights to RCOCCL with state-owned land. In addition, the reform of the benefit distribution system is fundamental to the effective implementation of this land reform. A balanced interest share mechanism is highly related to the sustainable development of the land market. While most existing studies tend to analyze the interest variation of farmers [11,12], few have sufficiently discussed the influence of the RCOCCL reform on the local government and explored its actual effect based on empirical quantitative analysis. However, if the local government as a policy implementer fails to gain or lose too much benefit in the reform process, the lack of enthusiasm of the government will greatly affect the effectiveness of policy implementation.

Therefore, a comprehensive analysis of the interest distribution of local governments in the reform pilot areas is essential to the promotion of RCOCCL marketization on a national scale. Even if the reform suffers from some problems, it nonetheless provides some important lessons for the corresponding policy-making. As such, we intend to explore the impact of the RCOCCL marketization reform from an interest distribution perspective using almost all pilot areas as empirical research samples. The following sections are organized as follows. The second section is the literature review and the third section provides a conceptual framework that briefly presents the influence mechanism of rural collective-owned land marketization on local government from the perspective of interest distribution. The fourth section describes selected variables and presents an empirical quantitative model based on the difference-in-difference (DID) method. The fifth section presents the analysis results, and performs the robust test of empirical model by using the counterfactual method, the propensity score match method and the Heckman two-step method. The sixth section discusses the analytical results and explain the reasons for the weakening effect of the RCOCCL marketization reform on local governments. The last section includes the conclusions of our study, the further research directions and suggestions to Chinese local governments as well.

2. Literature Review

As a land type with distinctive Chinese characteristics, researches on RCOCCL have been predominantly conducted in mainland China but have received little attention from scholars in the global academic community. Yet, the land property right system involved in

the RCOCCL marketization pilot reform is a classic issue of global concern. Land property rights are exclusive rights that exist on the land, and are also a collection of a series of land rights with land ownership at its core [13]. In the context of Western Economics, Marxist theory and Western Economic School of property rights are two important research theories of land property right study. The theoretical basis of the former is the labor value theory, and Marxist property rights analysis mainly focuses on land rent. The latter is mainly based on classical economics theory and places greater emphasis on transaction costs [13]. The difference between these two theories originates from the different land ownership systems, including the public ownership system and the private ownership system. According to Article 10 in the Constitution of the People's Republic of China (released in 1954), urban land ownership in Mainland China belongs to the state while rural land ownership belongs to rural collective organizations. This stipulation forms the legal basis of the well-known urban-rural land dual-structure. After the Land Administration Law of the People's Republic of China was amended in 1998, the usufruct right of rural collective-owned land may not be sold, transferred or leased for non-agricultural construction purposes, and free transaction of the ownership of collective-owned land is prohibited. The only legal way for rural collective-owned land to enter the land market is for local governments to expropriate it as state-owned land through the land expropriation system [14]. It means that local government is the only legitimate land transferee of the rural land and also the most important state-owned land transferor for real estate enterprises [15]. However, despite such legal constraints, a large number of ambiguous land property rights transactions still exist in China. By privately transferring land use rights or leasing buildings on the land, the "informal land market" are widespread in rural area in China with no legal permissions, especially in the suburban regions of metropolitans, which inevitably reduces the allocation efficiency of lands [16,17].

This illegal transformation of land property rights implies farmers' dissatisfaction with the existing land appreciation distribution system. Relying on its monopoly in the land expropriation system, the local government can obtain land resources through non-market means, and then sell the stated-owned land at market prices, thereby procuring a bulk of the land appreciation benefits [14]. On the other hand, farmers receive very little compensation for land expropriation, mainly because the production function of the expropriated rural land lacked a sufficient assessment of its social security and asset functions [18]. Especially in areas with rapid urbanization, land-lost farmers could not fully share in the value-added part of the land and have become what is known as the "three nothingness", an abbreviation for farmers who have "no arable land, no jobs, and no social security" [19]. Scholars have different opinions on the attribution of land appreciation benefits. John Mill firstly proposed that land appreciation brought about by social progress should be returned to the state through "special tax" [20]. Other classical economics scholars believe that population agglomeration and increased production are the main reasons for land appreciation, thus concluding that the whole society should share the land appreciation benefits [21]. They believe that land appreciation is a direct result of social and economic development, and the state should spare a portion of land appreciation for public utility development [22]. Conversely, in the case of private land ownership system, some scholars have illustrated that landowners with complete land property rights should obtain all natural appreciation rights of the land [23]. In developing countries in particular, rural land is the most important means of production for farmers, so land appreciation is closely related to the welfare and even survival of farmers [24]. At present, the view of balancing public interests and farmers' interests is widely accepted by both policy makers and scholars in China. The mainstream view is that part of the land appreciation should be used to support rural development under the premise of fair compensation for land-losing farmers, as is advocated by Professor Zhou Cheng [25].

What is the appropriate benefit distribution ratio for each participant in the rural collective land market? There are two major interest distribution relationships in the rural collective-owned land market, namely, the distribution relationship between the farmers'

collective group and the local government, and the distribution relationship between the collective group and the individuals with respect to the farmers' collective income [26]. When studying the relationship between the government and collective organizations, some scholars believe that because collective organizations have land ownership, the distribution of added land value is very likely to be biased towards farmers, and the proportion should be adjusted according to local standards [27]. Scholars who hold the opposite view believe that an appropriate increase in the distribution of benefits of local government is conducive to the implementation of policies, because local government still plays a leading role in the development of rural collective construction land transfer [28]. If the principle of fairness were faithfully applied, farmers would be the main beneficiaries of the distribution of added land value in the distribution of interests between collectives and individuals [29]. However, the collective group should reserve part of the land appreciation interest as a rural development fund to provide public welfare [24]. In addition, there are still some problems in the land distribution process, such as the uneven distribution of benefits and the chaotic distribution system of the village [27,30]. However, most previous studies tend to adopt a qualitative approach and discuss the distribution of land appreciation from a theoretical perspective, without enough empirical evidence from carefully designed quantitative research. It is not yet clear whether the reform plan aimed at protecting the interests of farmers has weakened the government's ability to distribute interests or vice versa. In addition, although this new reform means a huge adjustment of land property rights and contains many initial reform measurements, there is currently no systematic analysis of comprehensive distribution mechanism on this topic.

3. Interest Distribution Framework of Rural Collective-Owned Commercial Construction Land Marketization

From the interest distribution perspective, the RCOCCL marketization seeks to establish a new interest distribution system, which not only intended to protect farmers' interests, but also considers how to balance the interests of the government, real estate enterprises, and other land market participants. Previous studies have examined stakeholders involved in the RCOCCL marketization using a social network analysis and found that the actor network is complex [31]. In reform pilot areas, the actors in this network can be divided into four groups: the county-level government, township-level organizations, village-level organizations or members, and media organizations. As the transferees of land circulation, real estate developers are also important members in this network. Among them, 4 groups of actors, including the county-level government, township-level organizations, village-level organizations, and land transferees, are directly involved in the land interest distribution. Pilot areas' governments and their departments are the policymakers and supervisors of land transformation, while some township organizations, mainly township authorities, are policy implementers. The township land joint management companies or village-level economic organizations are entrusted by farmers, because the right of rural collective-owned land belongs to the farmers' collective organization and the farmers need representatives to exercise land use right [32]. As Figure 1 shows, the RCOCCL market directly connects with the asset agencies entrusted by farmers and land transferee-real estate enterprises instead of the original land circulation intermediary subject-local government. The land transfer fee from real estate enterprises is obtained by the land asset agencies through the land market and distributed internally in two parts: one part is for every farmer to share, and another part belongs to the village collective organization. If the transferred land was legally used by someone or a specific organization before land circulation, the corresponding compensation should be included in the land transfer fee.

Thus, farmers and the village collective group in this RCOCCL market actor network are impacted during the RCOCCL reform. Studies have examined the influence of the RCOCCL marketization. Yang conducted an empirical case study of the Pidu district in Sichuan province, China, and found that farmers obtained more property income and wage income after the RCOCCL marketization [12]. Specifically, the per capita property income from farmers' land circulation in the Pidu district increased by 2086 RMB Yuan.

As the market mechanism played a decisive role in the rural construction land allocation, it not only fully reflected the actual value of rural land assets, but also promoted the appreciation of land property. The reason for this may be the improvement in the welfare gain in the rural sector. Some scholars also found that rural welfare changes consisted of an urban-to-rural welfare transfer and a decrease in the net social welfare loss, which indicates a significant distribution efficiency improvement of land and land value [33,34].

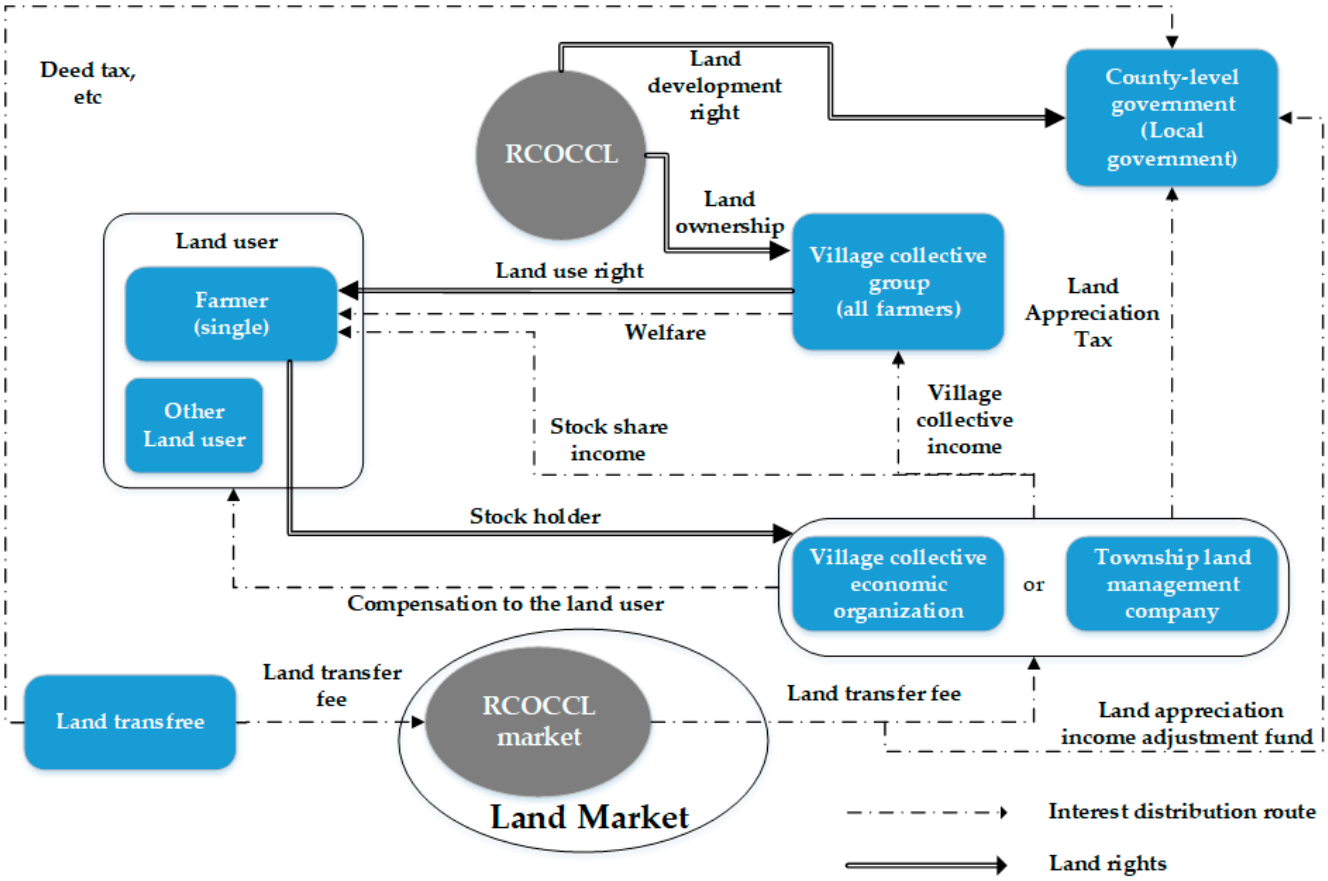

Figure 1. Interest distribution framework of RCOCCL market in pilot areas.

However, few studies have assessed the corresponding influence of the RCOCCL marketization on local governments. Will local government revenue be affected by the loss of the dominant position in rural land pricing and the land value distribution? Based on the actual reform measures in the pilot areas after 2015, we propose the following hypothesis: the RCOCCL marketization improves local government revenue.

As shown in Figure 1, local governments remain in the RCOCCL value distribution system. Although local governments no longer directly participate in the distribution of land transfer fees, the land appreciation tax, which is the major tax in the land circulation process, is inevitable. Another way for local governments to distribute the land interest is to impose land appreciation income adjustment fund [35]. Through taxation and adjustment fund, local governments could still obtain their interest share in the RCOCCL marketization. Although the proportion of land value distribution of one specific rural land after reform is less than what it was before, it could be regarded as the "extra income" of local governments because the RCOCCL land quota is not included in the annual land use plan. This is due to special administrative permission in the reform pilot period to improve the enthusiasm of local governments.

The RCOCCL marketization reform that started in 2015 provided a very appropriate samples to test our hypothesis. The whole reform pilot method can be regarded as a "quasi-natural experiment", while the pilot areas which are allowed to implement the

reform policies are the treatment samples and the other counties that maintain the original land system constitute the control group. Based on the pilot areas' experiment, the Chinese Central Government could comprehensively evaluate the actual effect of the RCOCCL reform, so as to formulate a more implementable national reform plan. By observing the difference in local government revenue between the treatment group and the control group, we can quantitatively estimate the impact of the RCOCCL marketization.

4. Materials and Methods

4.1. Selection of Study Samples

In 2015, the RCOCCL marketization pilot reform was implemented, 33 county-level administrative units in Mainland China were selected as the pilot areas. In view of the considerable differences in social and economic development among the various provinces, Chinese State Council promoted the balanced spatial distribution of the pilot areas and ensured that almost every province-level administrative region had its own pilot area(s). In addition to Zhejiang and Sichuan provinces, which had two pilot areas, the other 29 province-level administrative regions in Mainland China, including four province-level municipalities under the direct control of the State Council, had one pilot area. However, due to the enormous development gap between Xinjiang Uyghur autonomous region, Tibet, Inner Mongolia, and other provinces, we used 30 county-level pilot areas which belong to the remaining 28 provinces as the treatment group. Besides, Jizhou district, one of the RCOCCL reform pilot areas, lacked complete statistical data. Similarly, part of the rest of the county-level units also had missing data. Thus, the final research samples include the treatment group, which consists of 29 pilot areas, and the control group, which consists of 1602 county-level administrative units with complete census data. All samples are shown in Figure 2.

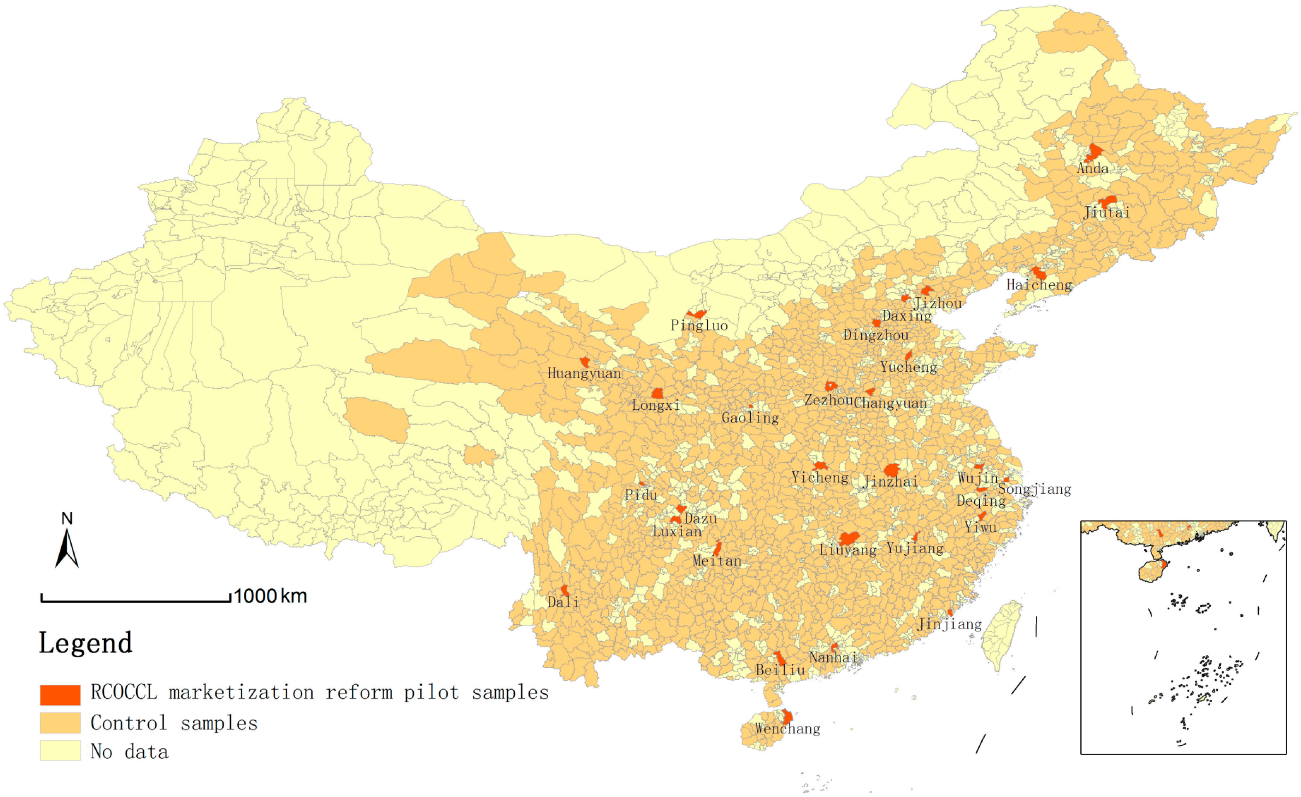

Figure 2. Spatial distribution of the RCOCCL marketization reform pilot areas.

4.2. Establishment of Empirical Model

4.2.1. Difference-in-Difference Method

The difference-in-difference (DID) method was widely used in natural science research in the last century. Economists introduced this method into economic studies in the 1970s and it became quickly adopted by scholars in policy research field [36,37]. The DID method is mainly used to explain causal effects when analyzing the influence of a specific event on research subjects. It can effectively avoid the endogenous problem of policies as explanatory variables and control the impact of unobservable individual heterogeneity on the explained variables when using panel data [38].

In this study, the difference-in-difference method was used to analyze the influence of the RCOCCL marketization reform on local government revenue. We divided the county-level administrative units into two groups including a treatment group and a control group. The basic DID model is expressed as follows:

$$GR_{it} = \beta_0 + \beta_1(T_t \times Group_i) + \beta_2 T_t + \beta_3 Group_i + \sum_{j=1}^{N} \alpha_j X_{jit} + \varepsilon_{it} \quad (1)$$

where the government revenue GR_{it} is the dependent variable, T_t is the time dummy variable that represents whether the year is before or after the event, and $Group_i$ is the group dummy variable indicating whether the research sample belongs to the control or treatment group. $T_t \times Group_i$ is the interaction term for the year and group that is used as the difference-in-difference variable and its coefficient β_3 is used to evaluate the causal effect of the RCOCCL marketization reform on government revenue. X_{jit} is the control variable that would impact government revenue and ε_{it} is the error term that is assumed to follow a normal distribution. Considering the impact of the individual and time effects, the DID model can also be represented as follows:

$$GR_{it} = \beta_0 + \beta_1(T_t \times Group_i) + \sum_{j=1}^{N} \alpha_j X_{jit} + \gamma_i + V_t + \varepsilon_{it} \quad (2)$$

where γ_i is the individual effect variable that can more accurately reflect the individual characteristics and replaces the original group variable $Group_i$ in model 1. V_t is the time effect variable that is used to replace the original time dummy variable T_t to accurately clarify the temporal characteristics. Model 2 is a two-way fixed-effects model that is optimized based on the basic DID model (model 1). β_1 is the critical coefficient in both of the aforementioned models. If β_1 is significant, it indicates that the RCOCCL marketization reform has a significant effect on local government revenue. Conversely, if β_1 is not significant, it means that the land reform has no significant impact.

4.2.2. Variable Selection

Dependent Variable

According to the interest distribution system of the RCOCCL marketization, local governments could benefit from the value-added land and primary land circulation through taxation and direct distribution. Those incomes would be counted in the local government revenue that contains the tax revenue and non-tax revenue according to the Chinese Bureau of Statistics. Tax revenue includes domestic value-added tax, income tax, resource tax, real estate tax, stamp tax, deed tax, and other urban taxes, of which the urban land-use tax and land value-added tax are also important. However, non-tax revenue includes income from administrative fees, fines, and confiscations, state-owned capital operations, and state-owned resources (assets) that includes the land circulation adjustment fund [39]. Thus, the RCOCCL marketization reform is closely related to local government revenue by influencing the land value-added tax and land circulation adjustment fee. We used local government revenue of county-level administrative units as the dependent variable.

Difference-in-Difference Analysis Variables

The DID model includes three major variables according to formula 1. For the group dummy variable $Group_i$, the research sample that belongs to the RCOCCL marketization reform pilot areas is set to 1; otherwise, the $Group_i$ was 0. Similarly, for the time dummy variable T_t, the year after 2015 is set to 1 because the RCOCCL marketization reform started on 27 February 2015, when the National People's Congress authorized the State Council to break through existing land management laws in the pilot areas [40]; otherwise, T_t is set to 0. In formulas (1) and (2), the DID variable $T_t \times Group_i$ is calculated by multiplying these two variables.

Control Variables

Previous studies have assessed factors influencing local governmental revenue. Revenue development is highly associated with local economic development and social affairs, and the impact factors also include factors representing the total amount and structural factors. Economic growth not only has a significant impact on the total tax revenue, but also a long-term stabilizing relationship with total revenue [41]. Scholars also found that there is a non-linear relationship between taxes and government revenue. Lin used the Laffer curve to illustrate a theoretical explanation and found that the top of China's Laffer curve is approximately 40% by applying the computable general equilibrium model [42]. Besides, the regional economic structure is also highly correlated to the local government revenue by impacting regional tax capacity [43]. Thus, this study used two economic indicators as control factors, including gross domestic product of each county-level administrative unit and the proportion of secondary and tertiary industries which indicate the economic structure of each research sample. Both of the above two factors are closely related to government tax, so as to control the tax income of local government.

There are considerable regional differences among those various county-level administrative units, and the population difference may be the most significant feature. Previous studies showed that the spatial imbalance and agglomeration of population distribution patterns in China are highly associated with regional urbanization development and further correlated to the government income [44,45]. Importantly, population density is also related to the government tax because a relatively higher population density always means more employment opportunities and more concentrated industries, including the service sector [43,46]. Therefore, we introduced two population indictors as the regional characteristic control variables, including the household registration population scale and population density.

4.2.3. Empirical Model Construction

Fixed-Effects Difference-in-Difference Model

Using the RCOCCL marketization pilot reform policy as the event in the DID method, we treat the pilot areas as the treatment group and the other county-level administrative units in Mainland China as the control group. Considering that the basic data are panel data, model 2 is used to estimate the impact of land system reform on local government revenue. Based on model 2, the empirical analysis model are as follows:

$$GR_{it} = \beta_0 + \beta_1 Treat_i \times Time_t + \alpha_1 GDP_{it} + \alpha_2 PSTI_{it} + \alpha_3 HRPS_{it} + \alpha_4 PD_{it} + \gamma_i + V_t + \varepsilon_{it} \quad (3)$$

where the independent variables include the DID variable $Treat_i \times Time_t$ and the control variables consist of the gross domestic product (GDP), proportion of secondary and tertiary industries (PSTI), household registration population scale (HRPS), and population density (PD). β_1 is the DID coefficient and α_1~α_4 is the control variable coefficient.

Propensity Score-Matching Difference-in-Difference (PSM-DID) Method

Because the RCOCCL marketization reform pilot policy is regarded as a quasi-experiment, there might be selection bias caused by the different initial conditions between the treatment group and control group [47]. The selection problem also exists, leading to

difficulty estimating the average processing effect because each research sample usually chooses whether or not to participate in the reform pilot areas according to this project's expected benefits. Rosenbaum and Rubin proposed the propensity score-matching (PSM) method to construct a statistical comparison group based on a model of the probability of participating in the treatment group using observed characteristics [48]. Each participant is matched to a non-participant based on a single propensity score reflecting the probability of participating conditional on their different observed characteristics and avoiding the "curse of dimensionality". The combination of PSM and the DID method is robust and efficient at removing biases due to covariates and estimating the influence on the treated samples [49]. The advantage of the PSM-DID method is that it can control the group difference of unobservable but time-invariant variables. Matched sampling could reduce the sensitivity of DID model-based adjustment to the model specification, promoting the estimation accuracy of parametric approximations of the treatment effect [50].

In this study, the logit model is first used to calculate the p score of the treated and control samples. In this step, the choice of characteristic variables is significant. It is mainly based on the conditional independence hypothesis and the covariates are related to the intervention and outcome variables. Introducing the variable into the PSM estimation model improves the estimation accuracy, while the variables that are not related to the outcome variables slightly increase the estimation model's standard error. Thus, whether or not the covariates are related to the intervention variables can be used as characteristic variables in the PSM model. We chose the GDP, PSTI, HRPS, PD, residential deposits (RD), and gross value of industrial enterprises (GVIE) as the characteristic variables to evaluate the p score. Then we applied the nearest-neighbor matching method and sampling without replacement to search for the matching samples. Because the panel data cover 9 years, the PSM method is used to separately analyze the data in each year to obtain an unbalanced PSM panel data of which treated samples are annually consistent and the control group annually varies [51]. The DID method is used to analyze the policy impact based on this unbalanced PSM panel data. Because the research samples in the control group varied annually, the DID fixed-effects model is unsuitable. We built the empirical DID model in this part based on model 1 as follows:

$$GR_{it} = \beta_0 + \beta_1 Treat_i \times Time_t + \beta_2 Treat_i + \beta_3 Time_t + \alpha_1 GDP_{it} + \alpha_2 PSTI_{it} + \alpha_3 HRPS_{it} + \alpha_4 PD_{it} + \varepsilon_{it} \quad (4)$$

Sometimes the policy impact has a time-lag effect [52,53]. To estimate the time-lag effect, we added the time-lag variables into model 4 and obtained a time-lag effect difference-in-difference model as follows:

$$\begin{aligned} GR_{it} = \beta_0 + \beta_1 Treat_i \times Time_t + \beta_2 Treat_i + \beta_3 Time_t + \beta_4 Treat_i \times Time_{t-1} + \beta_5 Treat_i \times Time_{t-2} + \alpha_1 GDP_{it} \\ + \alpha_2 PSTI_{it} + \alpha_3 HRPS_{it} + \alpha_4 PD_{it} + \varepsilon_{it} \end{aligned} \quad (5)$$

where $Time_{t-1}$ indicates the time dummy variable of the previous year and $Time_{t-2}$ represents the data from the two previous years. If β_4 or β_5 is significant in the estimation, it means that the RCOCCL reform policy has a time-lag influence on the local government revenue; otherwise, it has no time-lag effect.

4.3. Data Source and Preparation

This study mainly uses census data from the China Statistic Yearbook (county-level) from 2011 to 2019. The original data directly from the yearbook include the HRPS, GDP, primary industry gross domestic product (PGDP), land area (Area), RD, and GVIE. The PD is obtained by dividing the HRPS and Area, while the PSTI is obtained by removing the primary industry product proportion from the total GDP scale. To eliminate the impact of price changes on the comparability of economic indicators, the yearbook uses the constant price data. However, the census data between 2010 and 2015 are based on the constant price in 2010 and the census data after 2015 are based on the constant price in 2015. Thus, we transform the census data after 2015 into the same constant price in 2010 and the conversion

indicator is 1.14. The descriptive statistics of the independent variables and dependent variable are shown in Appendix A.

5. Results

5.1. Results of the Fixed-Effects DID Model

This study initially used three estimation models to evaluate the coefficient of the DID variables and three test methods to find the estimation model with the highest precision. As Table 1 shows, the F test is significant at the 5% level, which means that the fixed-effect (FE) model is better than the pool model. The BP test shows a significant result at the 5% level, which means that the random-effect (RE) model is better than the pool model. The Hausman test is also significant, which means that the FE model is better than the RE model. Thus, the DID fixed-effects model is adopted as the estimation method for the final results.

Table 1. Comparable statistics of panel analysis models.

Test Type	Related Models	Descriptive Statistics
F test	FE model and POOL model	F (1631, 13,050) = 12.613, $p = 0.000$
BP test	RE model and POOL model	$\chi^2(1) = 18{,}400.285$, $p = 0.000$
Hausman test	FE model and RE model	$\chi^2(5) = 54.946$, $p = 0.000$

As shown in Table 2, the estimation coefficient of the DID variable ($Treat_i \times Time_t$) is positive and significant at the 1% significance level. It indicates that the RCOCCL reform has a positive effect on local government revenue. Regarding the county-level administrative units' characteristics, the estimation coefficient of the HRPS and PD both have no significant impact on local government revenue, as indicated by the p values ($p > 0.05$). However, the coefficients of economical control variables that include the GDP and PSTI are both significant at the 1% significance level. However, the coefficient of GDP is positive while the coefficient of PSTI is negative. This means that GDP growth is positively associated with local government revenue, but the promotion of non-agriculture economic structure has a negative relationship with the local government revenue growth.

Table 2. Estimation results of the fixed effects DID model.

Variables	Coef.	Std. Err	*t*	*p*
Intercept	11,266.541	9478.33	1.189	0.235
HRPS	92.451	163.876	0.564	0.573
PD	21.607	3586.163	0.006	0.995
GDP	0.085	0.001	102.204	0.000 **
PSTI	−59,650.088	5801.207	−10.282	0.000 **
$Treat_i \times Time_t$ (DID variable)	17,884.613	6412.568	2.789	0.005 **
Statistics of model: $R^2 = 0.475$, Adjust $R^2 = 0.409$, $F = 2358.477$, $p = 0.000$				

Notes: ** $p < 0.01$.

5.2. Robustness Test of the DID Model

5.2.1. Results of the Counterfactual Test

This study used the counterfactual framework method to test the robustness of the fixed-effects DID model. We assumed two counterfactual situations. The first assumed situation is that the RCOCCL marketization reform pilot policy was proposed in 2014, one year ahead of the actual date in 2015. Conversely, the second assumed situation set 2016 as the beginning year of the RCOCCL marketization reform, which was one year after 2015. Those two counterfactual situations constitute the time dummy variable $Time_t$ and interaction variable $Treat_i \times Time_t$, while the independent and control variables remain

unchanged. If the estimation regression model of either counterfactual situation analysis shows that the DID variable has a significant influence on local government revenue, the estimation of the empirical model is biased. Otherwise, the empirical model is robust and the analysis results are credible.

As shown in Table 3, using formula (3) as the estimation model, the two regression models of the counterfactual situation pass the t test. However, the estimation coefficients of the DID variable in the two models are significant, which means that the reform policy has a significant impact on the local government revenue in the assumed situations. These results suggest that the fixed-effects difference-in-difference model does not conform to the parallel trend assumption. However, this result may also have been caused by selection bias in the estimation process of the "virtual variable," the RCOCCL marketization policy. Thus, we further introduced the PSM-DID model to test the effect of the RCOCCL marketization.

Table 3. Estimation results of the counterfactual analysis.

Model	Statistics of Model				
Counterfactual situation 1: start in 2014	R^2 = 0.475, Adjust R^2 = 0.409, F = 2358.850, p = 0.000				
	Variable	Coefficient	Standard Error	T-Test Value	Sig.
	DID variable	19,063.645	6441.031	2.96	0.003 **
Counterfactual situation 2: start in 2016	R^2 = 0.475, Adjust R^2 = 0.409, F =2357.212, p = 0.000				
	Variable	Coefficient	Standard Error	T-Test Value	Sig.
	DID variable	14,216.722	6736.578	2.11	0.035 *

Notes: * $p < 0.05$, ** $p < 0.01$.

5.2.2. Results of the PSM-DID Method

Using one-to-one matching of the treated samples in the control group in each year, a new propensity score-matching control group is obtained. As Appendix B shows, the absolute value of the standardized deviation of the six characteristic indicators is less than 20%, and the t test is not significant in the matched group. These results suggest that the propensity score matching fairly eliminates the influence of choice. Then we used formula 4 for the regression. Compared with the fixed-effects difference-in-difference model, the fitting value of goodness almost doubles. As shown in Table 4, the estimation of the DID variable was not significant, which means that the RCOCCL had no significant influence on the local government revenue.

Considering the time-lag effect of the RCOCCL reform, we also used formula (5) to estimate the coefficient of the time-lag variables. However, as shown in Table 5, the estimation coefficient of $Treat_i \times Time_{t-1}$ and $Treat_i \times Time_{t-2}$ is not statistically significant in either case. This means that the RCOCCL reform not only has no significant influence on the current local government revenue, but also has no significant association with the government revenue in the following two years.

5.2.3. Results of the Heckman Two-Step Method

There may be a self-selection problem in the RCOCCL reform pilot areas' selection, that is, the counties with more government revenue are more likely to become the pilot areas. To avoid this selection bias in our DID regression, we applied the Heckman two-step method to estimate the regression model: first, we used the selection equation to evaluate the probability of local government to get the reform policy and obtained the inverse Mills ratio lambda; second, the estimated inverse mills ration lambda was put into the DID regression model as the control variable, so as to estimate a more accurate impact effect of the RCOCCL reform policy. As shown in Table 5, the estimation coefficient of lambda is significant to the government revenue, illustrating that the self-selection existed and the

Heckman two-step method was necessary. However, the DID variable in this regression model was still not significantly related to the dependent variable. This means that there is no significant impact of the RCOCCL reform policy on the pilot areas' government revenue after eliminating the endogenous self-selection problem.

Table 4. Estimation results of PSM-DID model.

Variables	Coef.	Std. Err	*t*	*p*
Model 1 (no time-lag)	R^2 = 0.868, Adjust R^2 = 0.866, F = 481.514, p = 0.000			
Intercept	10,255.328	85,943.313	0.119	0.905
HRPS	−758.584	229.530	−3.305	0.001 **
PD	173,863.109	232,171.801	0.749	0.454
GDP	0.082	0.002	41.297	0.000 **
PSTI	−19,426.084	100,878.352	−0.193	0.847
$Treat_i$	1351.944	19,869.923	0.068	0.946
$Time_t$	73,667.697	21,348.887	3.451	0.001 **
$Treat_i \times Time_t$ (DID variable)	−53,696.542	29,799.873	−1.802	0.072
Model 2 (with time-lag)	R^2 = 0.868, adjust R^2 = 0.865, F = 373.081, p = 0.000			
$Treat_i \times Time_{t-1}$	−5652.358	44,528.066	−0.127	0.899
$Treat_i \times Time_{t-2}$	6863.855	38,554.296	0.005	0.178
$Treat_i \times Time_t$ (DID variable)	−52,891.698	40,454.680	−1.307	0.192

Notes: ** $p < 0.01$.

Table 5. Estimation results of Heckman two-step model.

	Coef.	St. Err.	*t*-Value	*p*-Value	95% Conf.	Interval	Sig
$Time_t$	22,153.707	8533.663	2.60	0.009	5428.035	38,879.378	**
$Treat_i$	103,122.79	29,042.065	3.55	0	46,201.384	160,044.19	**
DID variable	32,375.02	41,051.445	0.79	0.43	−48,084.335	112,834.38	
HRPS	0	0.001	−0.32	0.747	−0.001	0.001	
GDP	0	0	45.30	0	0	0	**
PSTI	3.032	0.201	15.12	0	2.639	3.425	**
PD	0	0	−5.93	0	−0.001	0	**
Constant	−4.744	0.169	−28.11	0	−5.075	−4.414	**
lambda	−177,733.49	6889.406	−25.80	0	−191,236.48	−164,230.5	**
Dependent variable: GR							
Mean dependent var	273,428.254		SD dependent var		290,019.804		
Number of obs	14,688		Chi-square		41.586		

Notes: ** $p < 0.01$.

6. Discussion

Contrary to the theoretical analysis, the results of our empirical research show that local government revenue is not significantly influenced by the RCOCCL marketization reform from 2015 to 2018. In fact, the subsequent policy adjustment by the Chinese Central Government also corroborates this research finding. In December 2018, the Chinese National People's Congress rolled out a plan to "Extend the authorization period for the State Council to temporarily adjust and implement relevant laws and regulations in 33 pilot areas". It extended the reform time to the end of 2019 and this extra time is for the pilot areas' local governments to further explore reform context and summarize the reform experience. Subsequently, the amendment of Land Management Law defined the land usufruct right of RCOCCL, but the state council lack the national specific land market

reform plan and encourage the local government to further explore new marketization methods without violating the law.

Why the RCOCCL marketization reform does not significantly impact local government revenue? The first reason lies in the lower efficiency of the RCOCCL marketization. In general, RCOCCL is discretely distributed and small-sized. The governments in many pilot areas integrated scattered rural construction lands and then put them into the land market by adopting the "land integration and marketization" reform method. (Land integration and marketization method refers to the land marketization process that the local government reclaims the scattered RCOCCL firstly and then gathers the total land quota to one large construction land for circulation.) However, it implies a traditional problem that was common in past land reforms such as the linkage between "urban-land taking and rural-land giving" leading to an inaccurate evaluation of the RCOCCL land-use value, because the core attributes determined the land value related to the new integrated land instead of the original RCOCCL [54]. If the land trading system could not reflect the land resource scarcity and economic opportunities, it would distort economic behavior and eventually lead to low trading efficiency [55]. The second reason is the transfer of the land transaction cost. In the pilot areas of the RCOCCL market reform, local governments have always provided financial assistance for land transfer to make RCOCCL competitive in the land market. For example, a land administrative official in one pilot county in the coastal province illustrated that the local government revenue provided financial subsidies ranging from 150,000 to 200,000 RMB Yuan per mu (Mu is a commonly used area unit of land in China and about 666.667 square meters. Fifteen mu is equal to one hectare.) of RCOCCL, because total cost of RCOCCL land transaction would reach approximately 450,000 RMB Yuan per mu, far beyond the common industry urban-land transfer costs (from 350,000 to 400,000 RMB Yuan per mu). Besides, most local governments also returned land appreciation income adjustment funds to town-level governments and village organizations as a bonus to activate their reform enthusiasm. The third reason is the policy implementation deviation behavior of local governments. As local governments in pilot areas had more discretion in the RCOCCL reform, they allowed enterprises that informally occupied rural commercial construction land to be formal land users through the RCOCCL marketization process [35]. However, the land price of this RCOCCL circulation was always far lower than the normal market price. This directly affected the market price and further influenced the RCOCCL land market development.

7. Conclusions

Two years after a clear definition of RCOCCL was proposed in 2013, the Chinese State Council started the RCOCCL marketization pilot reform in 33 pilot areas in 2015. This land system reform focused on protecting rural residents' interests, and RCOCCL was given the same usufruct and disposal rights as the state-owned land. Balancing the interests of all participants is also an important task of this reform. Although the marketization of RCOCCL reduced the direct intervention of local governments, local governments still remained in the RCOCCL interest distribution system and supplement their fiscal revenues by collecting land appreciation income adjustment funds and taxes. Thus, we proposed the hypothesis that the RCOCCL marketization would improve local government revenue. This study used the optimized DID method to analyze the impact of the RCOCCL reform on local government revenue based on the panel data from 29 pilot areas and 1602 county-level administrative units from 2010 to 2018. However, the empirical results show that the RCOCCL pilot reform does not have a significant influence on local government revenues. During the reform process in the pilot areas, local governments adopted the "land integration and marketization" method of the RCOCCL in addition to promoting the land directly into the land market. This method does not accurately reflect the original RCOCCL value, because the land circulation price is determined by the new integrated land, which leads to lower trading efficiency of the RCOCCL market. To properly complete the "political task" of the RCOCCL reform assigned by the State Council,

local governments are willing to promote the RCOCCL circulation amount using financial subsidies. Local government are always willing to return the land appreciation income adjustment funds that were originally included in the county-level government revenue to town-level governments and village-level organizations to stimulate their enthusiasm. In this reform, the governments of some pilot regions also legalized the initial informal RCOCCL occupation, which led to the breakdown of the land market price mechanism. Compared with previous studies, we proposed a comprehensive RCOCCL marketization interest distribution framework based on the land property reform and the empirical reform methods. It clearly showed the land appreciation distribution mechanism which is not only crucial to our research of the local government, but also meaningful to the further interest distribution analysis. In addition, this study also revealed the actual influence of RCOCCL marketization reform on the local government's interest distribution by using quantitative analysis of pilot samples in Mainland China. This is an important review of the RCOCCL pilot reform, providing feedback for the Chinese State Council to optimize the implementation measures of the national RCOCCL reform.

Due to the policy implementation discretion of county-level governments, they can control the adverse effects of reform in a relatively small scale and quickly adjust the content of the RCOCCL reform based on actual implementation feedback. In the pilot areas, the problems and conflicts of interest exposed during the pilot period can also provide very important references for the formulation and implementation of national policies. How much local governments should obtain under the new benefit distribution framework to maintain policy implantation enthusiasm will be an important issue for the future development of the RCOCCL market and an important research direction. In addition, in order to effectively promote the marketization of RCOCCL, local governments should reduce administrative intervention and allow market mechanisms to adjust RCOCCL rewards to form a real market-oriented land market. Thus, the relationship between government administrative intervention and land marketization is worthy of further study in order to get a better understanding of the influence of administrative behavior on RCOCCL market efficiency.

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Appendix A. Descriptive Statistics of Variables

Year	Variable	Min	Max	Mean	Standard Deviation	Median
2010	GR	300.0	1,631,331.0	56,371.9	108,144.5	28,305.0
	HRPS	1.0	233.0	52.4	35.7	44.0
	GDP	11,200.0	21,002,800.0	1,116,947.7	1,597,056.7	700,600.0
	PSTI	0.023	0.994	0.775	0.124	0.787
	RD	2600.0	15,448,609.0	626,432.6	910,742.4	406,828.0
	GVIE	100.0	65,908,022.0	1,738,703.2	3,961,337.5	638,597.0
	PD	0.2	2727.3	336.3	294.5	235.0
2011	GR	485.0	2,002,188.0	73,250.7	130,060.6	37,418.0
	HRPS	1.0	236.0	52.6	36.1	44.0
	GDP	13,348.1	22,570,284.0	1,228,677.8	1,718,190.7	765,798.1
	PSTI	0.030	0.994	0.769	0.125	0.779
	RD	4383.0	16,301,524.0	723,712.5	1,000,984.2	479,110.0
	GVIE	100.0	72,822,072.0	2,154,756.0	4,566,898.9	851,688.0
	PD	0.2	2727.3	338.3	299.0	236.8
2012	GR	872.0	2,202,750.0	88,607.0	145,898.0	47,153.0
	HRPS	1.0	238.0	52.7	36.2	44.0
	GDP	15,496.2	24,137,769.0	1,340,386.2	1,842,292.8	840,627.6
	PSTI	0.108	0.994	0.766	0.129	0.777
	RD	8952.0	18,232,871.0	860,276.0	1,143,143.1	575,852.0
	GVIE	100.0	76,868,173.0	2,418,879.1	4,841,973.1	1,010,697.5
	PD	0.3	2696.6	338.7	297.5	237.8
2013	GR	1082.0	2,435,188.0	109,751.1	169,523.7	59,612.0
	HRPS	1.0	242.0	52.9	36.5	44.0
	GDP	18,004.0	29,200,800.0	1,653,603.2	2,200,118.6	1,048,722.0
	PSTI	0.319	0.994	0.798	0.108	0.808
	RD	201.0	19,715,140.0	995,126.6	1,276,898.5	673,966.0
	GVIE	100.0	81,572,964.0	2,747,876.4	5,260,945.3	1,173,290.0
	PD	0.2	2809.0	340.1	300.2	238.4
2014	GR	1292.0	2,636,593.0	120,321.4	189,101.7	64,117.5
	HRPS	1.0	243.0	53.2	36.7	44.0
	GDP	21,300.0	30,007,053.0	1,772,049.8	2,333,464.5	1,128,448.0
	PSTI	0.311	0.994	0.802	0.106	0.813
	RD	7429.0	20,812,189.0	1,111,478.6	1,359,950.8	763,480.5
	GVIE	101.0	78,523,910.0	3,008,304.1	5,511,444.5	1,291,493.5
	PD	0.2	2809.0	341.9	301.2	239.4
2015	GR	2614.0	2,847,589.0	126,824.9	204,514.9	65,280.0
	HRPS	1.0	246.0	53.2	36.8	44.0
	GDP	23,189.0	30,800,198.0	1,851,434.8	2,395,443.2	1,188,088.0
	PSTI	0.297	0.992	0.803	0.106	0.813
	RD	14,810.0	22,256,788.0	1,247,966.9	1,482,458.9	872,426.5
	GVIE	101.0	82,709,675.0	3,140,648.7	5,688,341.8	1,327,365.5
	PD	0.2	2809.0	342.8	302.9	239.3
2016	GR	2174.2	2,791,485.1	117,815.8	196,171.5	60,444.0
	HRPS	1.0	244.0	53.5	37.0	44.0
	GDP	25,613.8	27,661,996.0	1,735,578.7	2,237,672.5	1,101,613.6
	PSTI	0.386	0.993	0.825	0.094	0.834
	RD	14,603.4	21,048,171.0	1,228,735.0	1,424,355.8	860,517.6
	GVIE	102.0	83,832,389.0	3,282,341.4	5,920,942.3	1,359,987.5
	PD	0.2	140,000.0	477.2	3739.5	242.1

Year	Variable	Min	Max	Mean	Standard Deviation	Median
2017	GR	1292.8	3,085,497.2	125,721.5	217,713.9	64,480.0
	HRPS	1.0	247.0	53.6	37.4	44.0
	GDP	25,872.9	30,813,501.0	1,893,669.6	2,512,522.2	1,185,127.8
	PSTI	0.382	0.993	0.838	0.093	0.851
	RD	16,139.6	21,654,279.0	1,349,839.5	1,523,119.7	961,750.0
	GVIE	50.0	86,819,784.0	3,541,701.0	6,307,144.3	1,445,835.9
	PD	0.2	3033.7	346.0	308.5	243.0
2018	GR	0.0	4,308,273.3	137,517.7	257,467.8	70,724.8
	HRPS	1.2	247.4	53.6	37.3	44.3
	GDP	28,385.0	33,542,675.3	2,025,306.6	2,684,352.0	1,251,747.5
	PSTI	0.373	0.993	0.840	0.092	0.854
	RD	17,008.8	23,311,821.9	1,503,455.4	1,682,044.9	1,064,535.6
	GVIE	100.0	89,807,178.0	3,806,290.5	6,702,655.2	1,534,847.0
	PD	0.2	3078.7	346.7	309.6	243.5

Appendix B. Variation of Standardization Deviation of Characteristic Indicators

Year	Variables	Matching Situation	Standardization Deviation	Variation of Standardization Deviation	*t*	*p*
2010	HRPS	Before	67.16%	90.11%	3.572	0.001
		After	6.64%		0.253	0.801
	GDP	Before	70.70%	99.68%	2.878	0.008
		After	−0.23%		−0.009	0.993
	PD	Before	66.82%	93.46%	3.123	0.004
		After	4.37%		0.166	0.869
	PSTI	Before	52.81%	85.73%	4.583	0
		After	−7.54%		−0.287	0.775
	GVIE	Before	52.80%	99.48%	2.178	0.038
		After	−0.28%		−0.011	0.992
	RD	Before	66.95%	81.71%	2.621	0.014
		After	12.24%		0.466	0.643
2011	GDP	Before	72.05%	94.32%	2.936	0.007
		After	4.09%		0.156	0.877
	HRPS	Before	68.57%	83.33%	3.64	0.001
		After	11.43%		0.435	0.665
	PD	Before	68.13%	62.10%	3.159	0.004
		After	25.82%		0.983	0.33
	PSTI	Before	65.63%	93.26%	3.761	0.001
		After	−4.42%		−0.168	0.867
	RD	Before	68.32%	85.86%	2.68	0.012
		After	9.66%		0.368	0.714
	GVIE	Before	55.29%	91.93%	2.315	0.028
		After	4.46%		0.17	0.866
2012	PD	Before	68.09%	89.15%	3.159	0.004
		After	−7.39%		−0.281	0.779
	PSTI	Before	62.31%	90.25%	3.528	0.001
		After	−6.08%		−0.231	0.818
	GVIE	Before	55.25%	85.65%	2.317	0.028
		After	7.93%		0.302	0.764
	RD	Before	70.74%	83.92%	2.777	0.01
		After	11.37%		0.433	0.667
	HRPS	Before	67.79%	94.44%	3.571	0.001
		After	−3.77%		−0.144	0.886
	GDP	Before	73.06%	88.51%	2.981	0.006
		After	8.39%		0.32	0.75

Year	Variables	Matching Situation	Standardization Deviation	Variation of Standardization Deviation	*t*	*p*
2013	HRPS	Before	64.32%	93.50%	3.355	0.002
		After	−4.18%		−0.159	0.874
	GDP	Before	74.80%	92.85%	3.066	0.005
		After	5.35%		0.204	0.839
	RD	Before	73.13%	80.85%	2.871	0.008
		After	14.00%		0.533	0.596
	GVIE	Before	57.71%	85.42%	2.399	0.023
		After	8.42%		0.32	0.75
	PSTI	Before	65.95%	92.40%	3.737	0.001
		After	−5.01%		−0.191	0.849
	PD	Before	64.67%	92.59%	3.009	0.005
		After	−4.79%		−0.182	0.856
2014	HRPS	Before	62.87%	68.15%	3.414	0.002
		After	−20.02%		−0.762	0.449
	GDP	Before	74.86%	97.21%	3.055	0.005
		After	2.09%		0.08	0.937
	RD	Before	73.92%	84.15%	2.91	0.007
		After	11.71%		0.446	0.657
	GVIE	Before	60.01%	94.37%	2.477	0.02
		After	3.38%		0.129	0.898
	PD	Before	63.79%	67.25%	3.031	0.005
		After	−20.89%		−0.795	0.43
	PSTI	Before	66.04%	91.98%	3.688	0.001
		After	5.30%		0.202	0.841
2015	HRPS	Before	62.61%	85.46%	3.394	0.002
		After	9.11%		0.347	0.73
	GDP	Before	76.83%	99.52%	3.158	0.004
		After	−0.37%		−0.014	0.989
	RD	Before	74.28%	96.76%	2.933	0.007
		After	2.40%		0.092	0.927
	GVIE	Before	60.20%	98.27%	2.48	0.019
		After	−1.04%		−0.04	0.969
	PD	Before	64.03%	89.76%	3.001	0.006
		After	6.55%		0.25	0.804
	PSTI	Before	64.48%	96.82%	3.581	0.001
		After	−2.05%		−0.078	0.938
2016	HRPS	Before	62.96%	99.43%	3.409	0.002
		After	−0.36%		−0.014	0.989
	GDP	Before	77.13%	93.64%	3.169	0.004
		After	−4.91%		−0.187	0.852
	RD	Before	75.85%	88.60%	3	0.006
		After	8.65%		0.329	0.743
	GVIE	Before	58.92%	96.10%	2.412	0.023
		After	−2.30%		−0.088	0.931
	PD	Before	3.28%	−78.09%	0.741	0.459
		After	5.84%		0.222	0.825
	PSTI	Before	57.65%	77.92%	3.739	0.001
		After	−12.73%		−0.485	0.63

Year	Variables	Matching Situation	Standardization Deviation	Variation of Standardization Deviation	*t*	*p*
2017	HRPS	Before	64.55%	79.42%	3.48	0.002
		After	13.29%		0.506	0.615
	GDP	Before	75.09%	98.19%	3.085	0.005
		After	1.36%		0.052	0.959
	RD	Before	76.94%	95.33%	3.054	0.005
		After	3.59%		0.137	0.892
	GVIE	Before	59.18%	96.77%	2.422	0.022
		After	1.91%		0.073	0.942
	PSTI	Before	72.47%	82.13%	4.359	0
		After	−12.95%		−0.493	0.624
	PD	Before	65.16%	77.06%	3.094	0.004
		After	−14.95%		−0.569	0.572
2018	GDP	Before	75.22%	87.23%	3.091	0.004
		After	−9.60%		−0.366	0.716
	RD	Before	78.02%	94.03%	3.105	0.004
		After	4.65%		0.177	0.86
	HRPS	Before	66.44%	85.14%	3.544	0.001
		After	−9.87%		−0.376	0.709
	GVIE	Before	59.31%	95.06%	2.428	0.022
		After	−2.93%		−0.112	0.912
	PSTI	Before	73.17%	93.93%	4.427	0
		After	−4.44%		−0.169	0.866
	PD	Before	66.37%	91.57%	3.109	0.004
		After	−5.60%		−0.213	0.832

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