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Routes Determine Results? Comparing the Performance of Differentiated Farmland Conservation Policies in China Based on Farmers' Perceptions

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Abstract: Revealing the performance of farmland conservation policies that use different types of policy instruments can provide a basis for optimizing such policies. Based on farmers' perceptions of farmland conservation policies, this paper conducted an empirical analysis using data on 986 rural households which were collected from seven towns/districts in three provinces of China. More specifically, this paper first uses propensity score matching to analyze the impact of the comprehensive application of economic incentive and command-and-control policy instruments on farmland conservation. Then, it explores the differences between the effects of local economic incentive farmland conservation policies (FCP-LE) that employed different policy instruments. Finally, the factors affecting farmers' perceptions of FCP-LE performance were identified. The results show that the combination of economic incentives and command-and-control policy instruments significantly improved the performance of farmland conservation policies. Furthermore, after comparing FCP-LE with payments to rural communities in the form of monetary compensation only, it is evident that a combination of FCP-LE with payments to farmers and integrated monetary compensation and social security subsidies yields better farmland conservation. Additionally, there are differences between the factors affecting farmers' perceptions of FCP-LE performance in different areas. Our findings aim to help encourage more areas to develop diversified local incentive policies in order to conserve farmland.

Keywords: farmland conservation; differentiated policy; policy performance; farmers' perceptions

1. Introduction

Conserving functional ecosystems that can benefit humans is a common challenge worldwide [1]. As a basic element of the ecosystem, farmland with multiple functions plays a considerable role in maintaining economic and social stability, and ensuring food security and ecological security [2]. With the tightening constraints on farmland resources, and an increasingly imperiled ecological environment, establishing and improving farmland conservation systems, and enhancing farmland resource management and conservation measures, have become practical issues that must be urgently addressed. Similar to other public policies, the realization of farmland conservation policy objectives relies on the selection and use of policy instruments [3].

Command-and-control and economic incentive instruments are two main categories of farmland conservation policy instruments. Administrative orders, laws, regulations, target plans, and planning indicators are common command-and-control policy instruments. Obligatory nature is the defining characteristic of these instruments [4], which are often backed by negative sanctions or the threat of sanctions. Economic incentive instruments involve either the handing out (incentives) or taking away (disincentives) of monetary or non-monetary material resources to change behavior. The former is more common, such as subsidies. The distinguishing feature of economic incentive instruments is that no one is

obliged to initiate a specific action [5]. Many countries are exploring the mixed usage of multiple policy instruments in their farmland conservation policy systems to maximize the combined power of farmland conservation [6]. The United States has implemented the Conservation Reserve Program (CRP) to encourage farmers to participate in farmland conservation through direct subsidies while also implementing rigid constraints, such as planning controls [7]. In Canada, the conservation of farmland has been strengthened at the national level as a result of improvements to the legislative system, whereas at the provincial level, the sharp decline in farmland has been addressed by implementing land use control measures and establishing compensation projects such as conservation tillage and permanent grassland cover based on local conditions [8]. For Asian countries with generally tense human–land relations, land zoning, land use control, and "environmental labeling" are mainly used in farmland conservation to address the conflict between economic development and food shortages [9].

As a developing country with a large population and scarce farmland resources, China regards farmland conservation as a core issue [10] and has established stringent farmland conservation policy systems [11]. Various policy instruments have been used, and are being used, in accordance with continually changing farmland conservation goals. Since 1978, China's economy has been growing rapidly, and as such, in the following ten years, farmland sharply decreased due to the fact that it was being arbitrarily occupied for non-agricultural utilization or agricultural structural adjustments [12]. Against this background, China applied several command-and-control policy instruments (including the definition of prime farmland zones, the implementation of the farmland requisition–compensation balance policy, and the implementation of land use control and land use approval) to curb the reduction of farmland [13]. In the early 1990s, more measures, including the prohibition of the illegal occupation of farmland and inspections of development zones nationwide, were added. The period from 1998–2007 witnessed the transformation of China's farmland conservation policy from quantity conservation to dual conservation of quantity and quality [14]. Measures that aimed to ensure the requisition–supplement balance of farmland and compensation for farmland acquisition appeared; however, although the farmland conservation instruments were becoming more diversified, they were still characterized by command-and-control [15]. Since 2008, China has promoted experimentation with local economic incentive farmland conservation policies (FCP-LE) in pilot cities in an attempt to synergize the use of economic incentives and command-and-control policy instruments to achieve better farmland conservation effects [16].

Unlike cities that only use national command-and-control farmland conservation policies (FCP-NC), which include planning controls and indicators, Chengdu in Sichuan Province has led the way in terms of establishing farmland conservation funds to provide economic compensation to farmers and rural communities [17]. Moreover, Foshan and Dongguan in Guangdong Province, Shanghai City, Suzhou in Jiangsu Province, and other places, have also carried out practices and explored the formation of diversified economic incentive farmland conservation models [18,19]. In September 2021, the General Office of the State Council of the People's Republic of China issued a document to propose further development requirements for improving the compensation mechanism for farmland conservation. The issuance of this policy presents new opportunities for the future development of farmland conservation policies, and at the same time, it increases the standards for farmland conservation.

Evaluating the performance of public policies is crucial to improving policy design and the subsequent implementation process [20]. Regarding economic incentive farmland conservation policies, previous studies have systematically explored relevant issues in the "pre-compensation" stage, which have included building a theoretical model [21], calculating compensation standards [22,23], selecting compensation patterns [24,25] and so on. At the same time, policy-makers should consider whether these large-scale fiscal funds, which have been invested by the government to satisfy farmland conservation policies that aim to provide an economic incentive, achieve the expected results [26]; therefore, some scholars

have researched the "post-compensation" stage. Such research has included the evaluation of the performance of farmland conservation policies that have an economic incentive; the evaluation has two main focuses. The first involves the evaluation of the performance of farmland conservation policies that have an economic incentive from a subjective standpoint. An important condition for the success of a public policy involves participants understanding, supporting, and recognizing the policy [27]. Most of the literature analyzes the satisfaction level [28], degree of participation [29], and response status of economic incentive farmland conservation policies [30] from the perspective of participating farmers. The results show that farmer satisfaction with farmland conservation policies that have an economic incentive has generally reached a level of basic satisfaction [31]; however, the influence of policy expectations and subsidy flow on farmer satisfaction with such policies cannot be ignored [32,33]. The second primary focus to arise from research evaluating the post-compensation phase involves the evaluation of the performance of farmland conservation policies that have an economic incentive from an objective standpoint. Studies have focused on the social, economic, and ecological impacts of farmland conservation policies that have an economic incentive since they were first implemented [34]. According to Xie and Cai [35], the economic effects of such policies can be seen in the growth of the total value of the livelihood assets of farmers, especially in terms of their financial and social assets. Further studies have pointed out that social effects are indirect manifestations of the implementation of farmland conservation policies that have an economic incentive, and they mainly refer to changes in the employment patterns of farmers and the concept of ecological conservation [36]. The ecological effects are shown through the improvement in the ecological quality of farmland [37]. Additionally, due to differences in the endowment of farmland resources among the regions where farmland conservation policies that have an economic incentive are implemented, considering whether there is regional heterogeneity in the performance of such policies has gradually become an important topic of research. The existing literature suggests that the performance of farmland conservation policies that have an economic incentive varies, as the policies cause different effects in different areas.

In general, researchers have carried out many useful explorations of the performance of farmland conservation policies that have an economic incentive, but there is a lack of research in terms of comparative studies on the performance of farmland conservation policies which adopt different types of policy instruments. In particular, performance evaluations and comparison-based evaluations that are grounded in farmers' perceptions of the policies need to be further enriched and supplemented. Accordingly, based on data on 986 rural households in Chengdu, Sichuan Province, Dongguan, Guangdong Province, and Wuhan, Hubei Province, our study focuses on differentiated farmland conservation policies that adopt different policy instruments, and it attempts to answer the following two questions: (1) Do areas that adopt both economic incentive and command-and-control policy instruments perform better than those that employ only command-and-control policy instruments? (2) Is there a difference in the performance of farmland conservation policies in areas that have adopted different economic incentive policy instruments? The answers to these two questions may be derived from an investigation into the effects of the implementation of farmland conservation policies; this will provide a theoretical basis and practical reference for improving the farmland conservation system and implementing differentiated farmland conservation policies.

2. Conceptual Framework

In China, the economic and social development status of different regions varies, as does the distribution of farmland resources, farmland conservation status, and its subsequent importance [38]; therefore, important and difficult issues concerning the conservation of farmland differ depending on region. On this basis, some agricultural areas and economically developed areas have implemented local compensation for farmland conservation practices under the FCP-NC framework. Moreover, farmland conservation policies have formed two levels of institutional exploration in China, namely, FCP-NC and FCP-LE

(Figure 1). Based on the above analysis, areas can be divided based on whether FCP-LE are implemented or not, thus creating the following types of area: (1) areas without local policy implementation (un-LPA), that is, areas where FCP-NC have been implemented but FCP-LE have not been implemented; (2) areas with local policy implementation (LPA), that is, areas where the implementation of FCP-LE is superimposed on the implementation of FCP-NC.
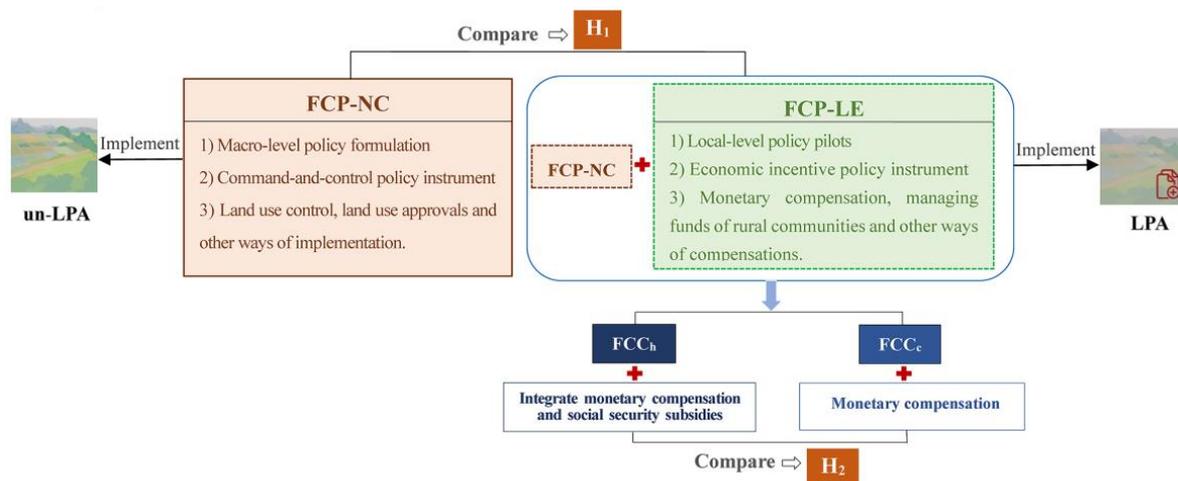

Figure 1. Conceptual framework.

2.1. Performance Differences between LPA and Un-LPA: (FCP-NC + FCP-LE) vs. FCP-NC

Under FCP-NC, users of farmland in un-LPA usually restrict farmland to its current use, without further development, to protect the national interest when making farmland use choices [39]. The natural openness of the farmland system also results in farmers' inability to limit the non-provisioning ecosystem services (ESs) provided by the farmland within the boundaries of their own property rights, thus leading to spillovers. Since the majority of these non-provisioning ESs cannot be reflected in market transactions, they fall under the category of public goods [40]; thus, all members of society can take advantage of the various benefits derived from farmland [41]. However, farmers that partake in this process bear the costs and responsibility of conserving farmland, and they do not gain economic benefits, which may lead to the abandonment and unsustainable use of farmland [42]. Compared with the non-agricultural utilization of farmland, traditional food-growing practices offer lower returns, and agricultural prices are less volatile [43]; however, such practices will result in direct users of farmland being in a passive state in terms of farmland conservation. The voluntary conservation of farmland will not be enthusiastic, thus resulting in the non-agricultural utilization and "non-grain" utilization of farmland, and it will also cause other issues, thereby diminishing the farmland conservation effects [44].

It is necessary to provide corresponding economic incentives to those who are actually responsible for implementing farmland conservation in order to achieve effective farmland conservation. Economic incentives are considered to be effective [45]. By utilizing economic means, the core idea is to coordinate the relationships between various stakeholders who are involved in the process of farmland use to achieve a fair distribution of the value of farmland and ensure a sustainable supply of farmland ESs. Existing studies have confirmed the positive role of economic incentive policy instruments in promoting farmland conservation behavior through empirical analysis, whereas the contribution of command-and-control policy instruments is relatively limited [46]. Moreover, since the implementation of FCP-LE, farmers' attitudes have also changed significantly, as shown by the fact that they cherish their own farmland resources more and take the initiative to strengthen farmland conservation [47]. Currently, farmland conservation policies that have an economic incentive are used only in a few areas of China, and thus, they have a

pilot demonstration effect. In a certain sense, this effect can encourage local governments to carry out farmland conservation work to create a positive atmosphere for farmland conservation in society and gradually improve people's subjective belief in conserving farmland; therefore, by optimizing the combination of economic incentives and command-and-control policy instruments, LPA may take better advantage of the combined effect of farmland conservation policy instruments and enhance farmland conservation effects. Based on the above analysis, we propose the following research hypothesis H_1: Compared with areas adopting only command-and-control policy instruments, the performance of farmland conservation policies is better in areas that comprehensively adopt economic incentives and command-and-control policy instruments.

2.2. Performance Differences among Areas with Different FCP-LE: FCP-LE$_{c/m}$ vs. FCP-LE$_{f/ms}$

In pilot areas implementing economic incentive farmland conservation policies, compensation schemes tailored to local conditions have been formulated, including direct or indirect compensation for farmers, compensation for working funds of rural communities, compensation for political accomplishments at the grassroots level, and construction compensation for improving the quality of farmland [48]. This indicates that there are differences between the specific policy instruments, as evidenced by the differences between compensation recipients and compensation patterns. At present, there are two main types of compensation according to FCP-LE. The first is compensation to rural households for farmland conservation (FCC$_h$), and the second is compensation to rural communities for farmland conservation (FCC$_c$). Compensation patterns include direct monetary compensation and the integration of monetary compensation and social security subsidies.

In China, since rural land is owned by rural communities, they undertake the task of managing and maintaining the land as participants in the FCP-LE. The restrictions on land use conversion during the implementation of farmland conservation policies have also caused rural communities to lose their corresponding land development rights [49]; therefore, it is necessary to compensate rural communities in order to improve local production and living conditions. Farmers, as the practical agents of farmland conservation, are more closely connected to the use of farmland, especially in terms of farmland quality conservation and soil pollution prevention; thus, some areas choose to use economic incentives for the benefit of farmers. On this basis, scholars have paid attention to the issue of who is compensated by FCP-LE. If only considered from the perspective of reducing transaction costs, it has been found that it is more effective to encourage compensation for rural communities [50]; however, the group that contributes the most to farmland conservation, namely, farmers, will not receive effective incentives. Therefore, the important role of farmers in farmland utilization and conservation has been underestimated, thus leading to a decrease in policy performance [51].

Although some studies found that the best way of distributing compensation funds to rural communities is to specifically use them for farmland conservation and agricultural development, and it is indeed helpful for strengthening farmland conservation, there is suspicion and confusion over the local government's obligation to conserve farmland [52]. In contrast, compensation to farmers can effectively avoid the unreasonable use of compensation funds, enhance the timeliness of compensation funds, and it can play a role in helping farmers change their existing survival and production status [53]. This measure is also conducive to the success of FCP-LE [54]. Furthermore, as rational economic agents, farmers aim to maximize their profits [55]. It is expected that higher economic benefits can be obtained through farmland conservation. If compensation is provided only to rural communities, it may cause farmers to be less motivated to conserve their farmland, and in turn, they may tend to pursue short-term interests. This indicates that a farmland conservation policy system that combines and complements government policy implementation and farmers' conscious conservation efforts is helpful, and this may result in better farmland conservation policy performance. On this basis, we propose research hypothesis H_2: The

performance of farmland conservation is better in areas that adopt FCP-LE$_{f/ms}$ than in areas that adopt FCP-LE$_{c/m}$.

3. Materials and Methods

3.1. Study Areas

In terms of LPA, since the establishment of an economic incentive mechanism for farmland conservation was proposed in a national policy document, nearly a quarter of Chinese provinces have actively carried out pilot work on FCP-LE. In 2008, both Chengdu, in Sichuan Province, and Dongguan, in Guangdong Province, initiated FCP-LE; the practice period was nearly 15 years, and progress was relatively stable. These two cities are also representative in terms of economic development and geographical location. Furthermore, farmers in the two cities have a deep understanding of FCP-LE; however, in terms of the specific use of economic incentive policy instruments, there are significant key differences between the two cities (Table 1), including (1) compensation recipients. Chengdu mainly compensates farmers who have land contractual management rights and bear responsibility for farmland conservation, whereas Dongguan directly compensates rural communities that assume responsibility for farmland conservation. With regard to (2) compensation patterns, Chengdu has combined farmland conservation subsidies with pension insurance subsidies for farmers, taking into account both monetary compensation and social security subsidies; in Dongguan, compensation funds are distributed among rural communities and are earmarked for farmland conservation and rural development.

Table 1. Comparison between FCP-LE: Chengdu vs. Dongguan.

LPA	Chengdu	Dongguan
Compensation recipients	People responsible for conserving farmland, such as farmers and rural communities.	Rural communities undertake the task of permanent basic farmland conservation, such as villages.
Compensation patterns	Integrating monetary compensation and social security subsidies: 10% of the total compensation funds are distributed among rural communities as guaranteed funds for the transfer of farmland and subsidies for the purchase of agricultural insurance. The remaining funds are paid to farmers through pension accounts. These funds are mainly used to guarantee the basic livelihood of their family members when the farmers reach the working age limit for discharging labor obligations, as stipulated by the state, or when they retire from their job due to old age, meaning that they have lost the ability to work. Farmers who do not want to participate in the insurance scheme can apply for a one-time cash withdrawal.	Monetary compensation only: all compensation funds are distributed to rural communities for projects such as farmland and forest conservation, agricultural development, public management, public services, and rural infrastructure construction and management.

In terms of un-LPA, Wuhan lies in the eastern Jianghan Plain, which has abundant farmland resources and a variety of land use practices. It is also a typical city, and a new first-tier city, and shares much in common with Chengdu and Dongguan in terms of urban hierarchy and economic development status; thus, Wuhan is comparable with these cities. Additionally, the city of Wuhan has not implemented FCP-LE; therefore, it can be used as an un-LPA sample.

In each city, 2–3 districts were selected as field research areas: Huangpi and Jiangxia in Wuhan, Shuangliu and Chongzhou in Chengdu, and Machong, Wangniudun, and Zhongtang in Dongguan (Figure 2).
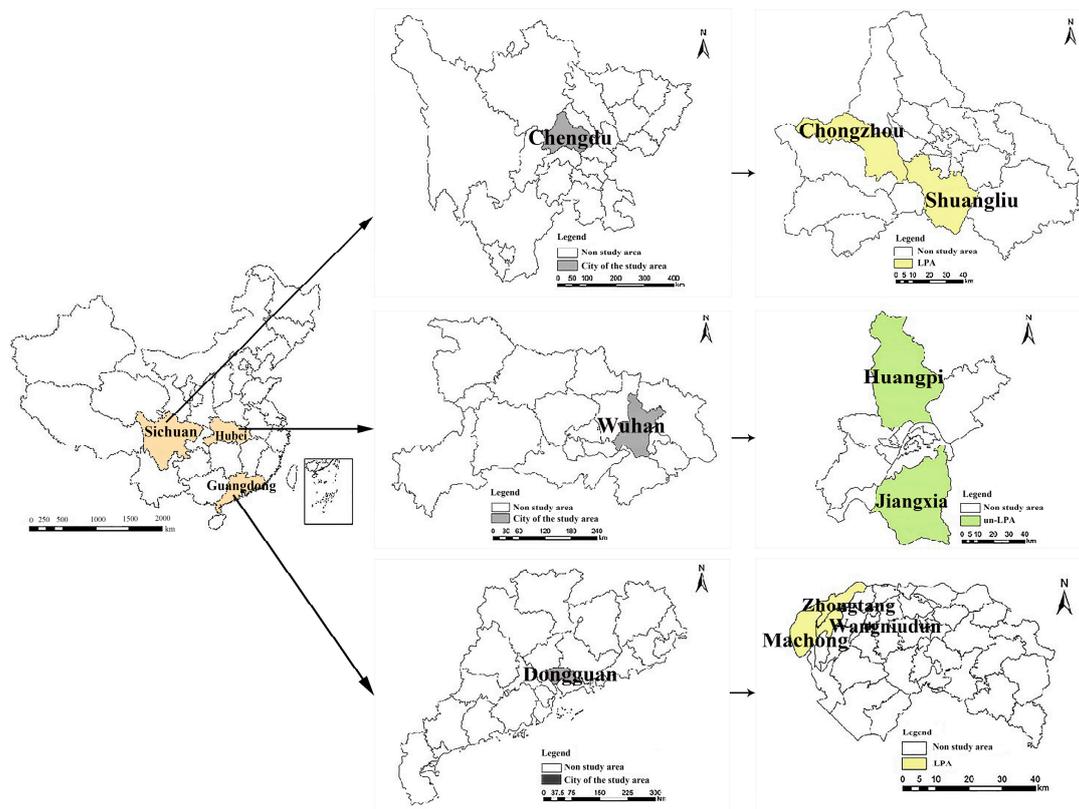
Figure 2. Location of the study areas.

3.2. Data Collection

Data were generated from face-to-face interviews in the selected areas. Our research group first selected villages in the Jiangxia District of Wuhan to conduct a small pre-survey sample, and then we tested the validity of the questionnaire design and revised the questions in the questionnaire. During 11–24 December 2019, a large sample survey was conducted in Chengdu, Dongguan, and Wuhan. Finally, 986 valid questionnaires were collected. The effective response rate was 89.6% (Table 2). Random sampling was used to select sample farmers, and the individual characteristics, household characteristics, and farmland conservation status of the interviewed farmers were obtained through one-on-one interviews. Additionally, tests showed that the questionnaire reliability α value was greater than 0.7, the Kaiser-Meyer-Olkin (KMO) value was 0.859, and the Bartlett test *p* value was <0.01. These results indicate that the data we used have good reliability and validity.

Table 2. Comparison of FCP-LE: Chengdu vs. Dongguan.

	Category		City	Districts	Valid Samples
LPA	FCP-NC + FCP-LE	FCP-LE$_{f/ms}$	Chengdu	Shuangliu	180
				Chongzhou	173
		FCP-LE$_{c/m}$	Dongguan	Machong	97
				Wangniudun	106
				Zhongtang	101
un-LPA	FCP-NC	FCP-NC	Wuhan	Huangpi	124
				Jiangxia	205
Total					986

3.3. Method

3.3.1. Entropy Method

As an effective means of weight calculation, the entropy method can avoid the influence of subjective judgment in the process of assigning weights, thereby ensuring that objective weights with more credibility and greater accuracy are obtained. This method mainly determines weights based on the impact of the amount of information on the overall outcome of interest; this information is provided by the indicator itself. When the degree of relative change in an indicator is greater, it indicates that the indicator is covering more information. Thus, the greater the indicator's influence on the performance of farmland conservation policy, the greater the weight should be; therefore, we use the entropy method to assign weights, and to supplement the weighted average method, in order to calculate the performance of farmland conservation policies in LPA and un-LPA.

3.3.2. Propensity Score Matching (PSM)

To compare the relationships between different farmland conservation policies using corresponding policy instruments and their performances (to address our first research question), it would be ideal and accurate to compare the performance of farmland conservation policies in LPA with and without FCP-LE; however, in reality, we cannot observe the performance of farmland conservation policies in LPA when FCP-LE has not been implemented, and therefore, this paper used PSM. Based on the idea of constructing a "counterfactual" framework, we used un-LPA instead, which has similar characteristics to the LPA. More specifically, the interviewed farmers in LPA were treated as the "treatment group". Then, the samples of farmers in un-LPA (i.e., the "control group") were used to estimate the performance of farmland conservation policies under counterfactual conditions in LPA, and they were compared with the performance of farmland conservation policies in LPA. Four matching methods, such as k-nearest neighbor matching, were used in the analysis. We calculated the average treatment effect (*ATT*) using Equation (1).

$$ATT \ = \ E(Y_{1i}|Z_i \ = \ 1) - E(Y_{0i}|Z_i \ = \ 1) \ = \ E(Y_{1i} - Y_{0i}|Z_i \ = \ 1) \tag{1}$$

In Equation (1), Y_{1i} represents the performance of farmland conservation policies in LPA, Y_{0i} represents the performance of farmland conservation policies if FCP-LE are not implemented in LPA, and Z_i indicates whether the area of farmer *i* is LPA. $Z_i \ = \ 1$ means that FCP-LE has been implemented in this area; otherwise, it is 0.

3.3.3. Cross-Tabulation Analysis (CTA)

CTA was used to compare farmers' subjective perceptions on the performance of differentiated FCP-LE in different LPAs. Cross-tabulations are commonly used to analyze whether there is a significant relationship between two variables, with the null hypothesis that the two variables are independent (H0: There is no relationship between different LPA and farmers' perceptions of FCP-LE performance). To verify the null hypothesis, hypothesis testing methods, including the chi-square test and Fisher's exact test, are usually used as an adjunct. The chi-square test commonly requires the values or expected frequencies in the cells of the cross-tabulation table to be greater than 5. When one of the expected frequencies is less than 5, the results of the chi-square test may not be accurate, and thus it is necessary to use Fisher's exact test. The smaller the calculated *p*-value, the further away it is from the null hypothesis. Moreover, we can conclude that there are significant differences in the perceived performance of FCP-LE in different LPAs.

4. Results

4.1. Comparison of Farmland Conservation Policy Performance between LPA and Un-LPA

4.1.1. The Evaluation Index System

Drawing on existing research [56], in this study, the performance of farmland conservation policies is defined in terms of the changes in the quantity, quality, and ecology of

farmland as perceived by farmers after the implementation of farmland conservation policies. The reason for this is that farmers are the most direct participants in, and witnesses of, farmland conservation policies, and market consumption theory asserts that the subjective feelings of users should be considered when judging the quality of a product or service. Similarly, when evaluating the performance of a public policy, attention should also be paid to the subjective feelings of the public; in this study, particular emphasis has been placed on individual farmers, as they contribute the most to farmland conservation [57]. Consequently, we constructed three primary indicators, which are: maintaining the quantity of farmland, ensuring the quality of farmland, and improving the ecological environment of farmland. We also constructed six secondary indicators, including: ensuring that the use of farmland does not change (Table 3). In the questionnaire, these indicators correspond to six questions concerning the performance of farmland conservation policies (Figure 3).

Table 3. Farmland conservation performance evaluation index system.

| Table	Primary Indicators	Secondary Indicators	Levels
The performance of farmland conservation policies (PERF)	Maintaining the quantity of farmland	Ensuring that the use of farmland does not change	1–5
		Slowing down the reduction of farmland area	1–5
	Ensuring the quality of farmland	Increasing the effective irrigation area	1–5
		Increasing the grain yield per unit area	1–5
	Improving the ecological environment of farmland	Increasing the recycling rate of mulch film	1–5
		Reducing the use of pesticides and fertilizers per unit area	1–5
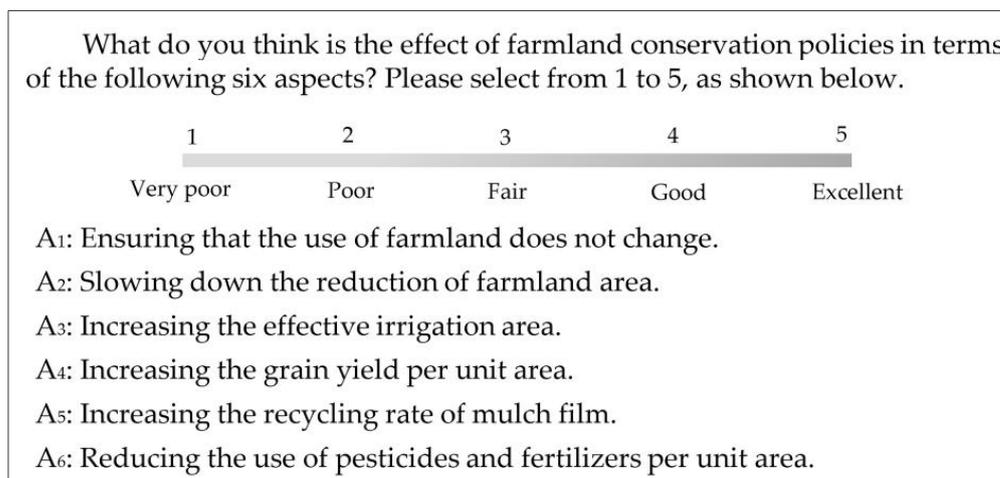
Figure 3. Six questions concerning the performance of farmland conservation policies in the questionnaire.

4.1.2. PSM Estimation

1   Variable selection and descriptive statistics of the variables

Based on existing studies [58] and the questionnaire, the following three categories of variables were set (Table 4). First, the outcome variable, which concerns the performance of farmland conservation policies, is measured by constructing an evaluation index system. Second, the treatment variable concerns whether FCP-LE have been implemented, with a value of 1 assigned to LPA and 0 assigned to un-LPA. Third, ten matching variables were selected from four categories: individual characteristics, household characteristics, cognitive characteristics, and the regional characteristics of the surveyed areas.

Table 4. Variable definition.

Variables		Explanation	Mean	St. Dev.
Outcome variable				
PERF		The performance of farmland conservation policies	0.61	0.15
Treatment variable				
FCP-LE		Dummy variable, LPA = 1; otherwise, 0	0.67	0.47
Matching variable				
Individual characteristics	AGE	Actual age	54.22	11.19
	EDU	Years of actual education	7.99	2.64
	VIL_cadre	Serving as village cadre = 1; otherwise, 0	0.12	0.32
	CTTE_trust	Strongly trust = 5, strongly distrust = 1	3.32	0.90
Household characteristics	LAB_ratio	Number of household laborers/total number of household members (%)	0.62	0.21
	INC_household	Total annual household income (10^4 yuan)	10.29	7.78
	AINC_ratio	AINC/INC_household (%)	0.17	0.85
Cognitive characteristics	CONG	The importance of farmland conservation: yes = 3, not clear = 2, no = 1	2.49	0.55
	UND	The understanding of farmland conservation policies: strongly understand = 5, strongly do not understand = 1	1.79	0.84
Regional characteristics	LOC	Located far from town = 1; otherwise, 0	0.62	0.49

In the collected samples, the average age of the farmers was approximately 54 years old. The number of years that the farmers spent in actual education was generally low, mainly concentrated in junior high school and below, and only a few farmers had experience as members of village cadres (Table 5). At the same time, the farmers had a certain degree of cognition and understanding with regard to the importance of farmland conservation; however, their understanding of farmland conservation policies was obviously insufficient. Additionally, although the rural households in the two types of areas were relatively similar in terms of *LAB_ratio*, there was a large difference in the *INC_household* levels between rural households. There are certain differences in the household characteristics of the farmers in LPA and un-LPA. A direct comparison between the subjective perceptions of farmland conservation policies by farmers in the two types of areas would cause biased results; therefore, we continued our analysis using PSM.

Table 5. Socioeconomic characteristics of the interviewed farmers.

Socioeconomic Characteristics	LPA		Un-LPA	
	Mean	St. Dev.	Mean	St. Dev.
AGE	53.98	11.21	54.70	11.15
EDU	8.01	2.68	7.94	2.55
VIL_cadre	0.13	0.34	0.10	0.30
CTTE_trust	3.47	0.90	3.03	0.81
LAB_ratio	0.62	0.23	0.63	0.17
INC_household	10.95	8.56	8.96	5.69
AINC_ratio	0.15	0.30	0.22	1.41
CONG	2.40	0.55	2.65	0.53
UND	1.81	0.90	1.76	0.68
LOC	0.77	0.42	0.30	0.46
Obs	657		329	

2.   Matching effect test

Before using PSM for the empirical test, we first applied the variance inflation factor (VIF) to test for multicollinearity. The results showed that the VIF value was 1.18, which was within the acceptable range. On this basis, a decision-making equation for farmers' participation in FCP-LE was constructed, and the common support and balance test was performed for the treatment and control groups to ensure the reliability of the matching results. After matching, the distribution and trend of the kernel density function of the two groups of samples were highly similar. The standard deviation of the variables was also greatly reduced (Figure 4), and the propensity scores mostly fell within the common range of values (Figure 5). Additionally, indicators such as the pseudo-R^2 and LR chi^2 showed a significant downward trend compared with those before matching (Table 6). These results all indicate that the matching quality of the sample data in our study is relatively good.
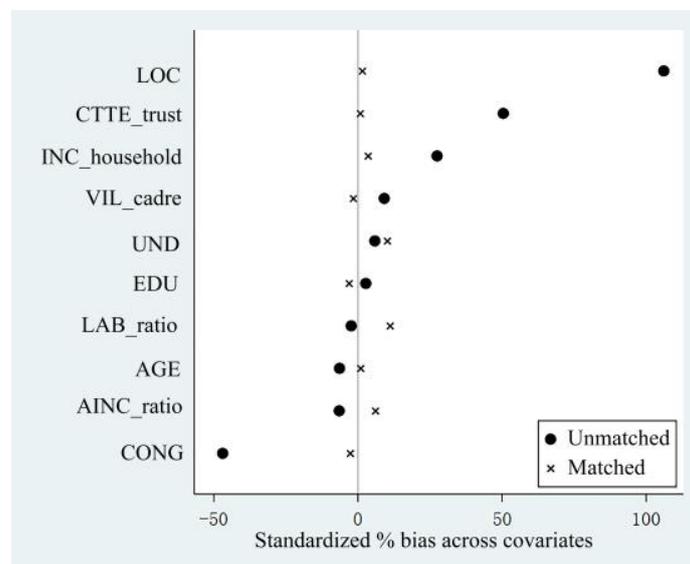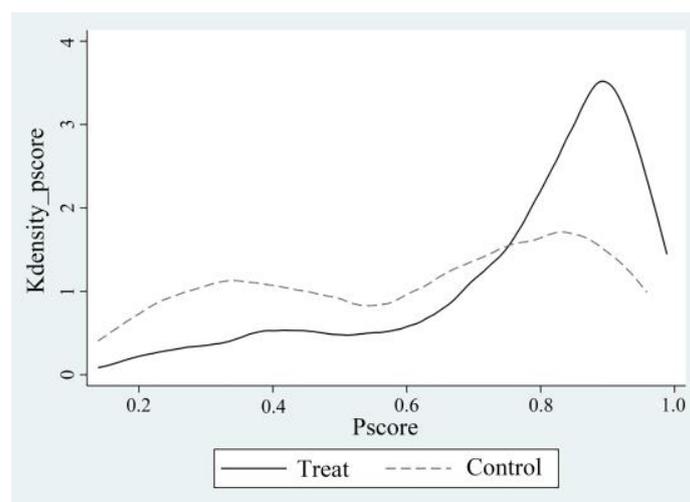

Figure 4. Standardized bias across covariates.

Figure 5. Propensity score density distribution after matching.

Table 6. Balance test.

Matching Methods	Pseudo-R^2	LR Chi^2	MeanBias (%)	MedBias (%)
Before matching	0.248	312.00	26.4	7.8
k-nearest neighbor matching (k = 4)	0.007	11.35	4.1	2.9
Radius matching (r = 0.05)	0.008	13.16	5.5	5.6
Kernel matching	0.008	12.83	5.4	5.7
Local linear matching	0.026	43.72	7.3	7.2

3. Impact estimation

We further analyzed the impact of the comprehensive application of economic incentives and command-and-control policy instruments on farmland conservation (Table 7). The results show that the ATT values obtained by the four matching methods above are basically consistent in terms of the direction of influence and the degree of significance, and they all have an impact that is significant at the 1% level, indicating that the estimation results are robust to some extent. More specifically, the ATT is in the range of 0.199–0.203, indicating that the performance of farmland conservation policies in LPA is 20.1% higher on average than in un-LPA. This result verifies hypothesis H_1: Compared with areas adopting only command-and-control policy instruments, the performance of farmland conservation policies is higher in areas that comprehensively adopt economic incentives and command-and-control policy instruments.

Table 7. Treatment effect of PSM.

Matching Methods	Treated	Untreated	ATT	S.E.
k-nearest neighbor matching (k = 4)	617	319	0.203 ***	0.013
Radius matching (r = 0.05)	617	319	0.201 ***	0.012
Kernel matching	617	319	0.201 ***	0.010
Local linear matching	617	319	0.199 ***	0.012
Mean	—	—	0.201	—

Note: ***: significance at the 1% levels.

4.2. Comparison of Farmland Conservation Policy Performance in Different LPA

4.2.1. Overall Perceptions

In the survey, we asked farmers the following question: "What do you think about the effectiveness of farmland conservation at the village level after the implementation of FCP-LE?" This question helped us obtain farmers' subjective evaluations of the performance of FCP-LE. Furthermore, we used CTA to test whether farmers' subjective perceptions of the performance of FCP-LE in LPA (Chengdu and Dongguan) were independent. The original hypothesis stipulated that there was no relationship between the two variables.

Based on the CTA results (Table 8), the mean value of the subjective perceptions of farmers in Chengdu is 2.40, which is slightly higher than that of farmers in Dongguan, with a value of 2.02. In addition, 41% of the farmers in Chengdu, where FCP-LE$_{f/ms}$ are implemented, believe that FCP-LE have achieved great results. In other words, farmers in Chengdu can clearly perceive the benefits and assistance brought about by FCP-LE. In contrast, in Dongguan, where FCP-LE$_{c/m}$ are implemented, only a few farmers who chose FCP-LE achieved better results. This finding indicates that the implementation of FCP-LE has not gained widespread social support at the local level, and farmers do not feel strongly about the effects of FCP-LE. The results indicates that Chengdu, which has implemented FCP-LE$_{f/ms}$, has achieved better farmland conservation results. Additionally, with regard to the cross-tabulation, because the number of cells with expected counts less than 5 is greater than 20%, we used Fisher's exact test to further verify the above conclusions. The results show that $p = 0.000 < 0.01$, which indicates that the original hypothesis can be rejected at the 1% level of significance. This result verifies hypothesis H_2: The performance

of farmland conservation is better in areas that adopt FCP-LE$_{f/ms}$ than in areas that adopt FCP-LE$_{c/m}$.

Table 8. Rural households' overall perceptions of the performance of FCP-LE.

LPA		Perceptions of FCP-LE Performance			Total	Mean	Fisher's Exact Test	p Value
		Poor Effect	Fair Effect	Greater Effect				
Chengdu	counts	3	207	143	353	2.40		
	expected counts	3.2	230.0	70.8	353.0	—	147.275	0.000
Dongguan	counts	4	290	10	304	2.02		
	expected counts	3.8	267.0	82.2	304.0	—		

4.2.2. Multidimensional Perceptions

In Chengdu, farmers have the strongest feelings about "slowing down the reduction of farmland area" and "ensuring that the use of farmland does not change" after the implementation of FCP-LE. The percentages of those who rated the sum of these two aspects as "good" and "excellent" were 68.56% and 59.49%, respectively (Table 9). This means that FCP-LE have been more effective in maintaining the quantity of farmland in Chengdu. In Dongguan, farmers believed that the implementation of FCP-LE played the most important role in "increasing the grain yield per unit area", accounting for 37.17% of the total. In contrast, the score that was obtained from the farmers' evaluation of the statement "slowing down the reduction of farmland area" was low, as was the score given to the statement "ensuring that the use of farmland does not change". According to the survey, due to the high cost of agricultural production materials and the low efficiency of food production, most farmers in Dongguan increase their household income by changing the use of farmland or transferring it. Doing so makes FCP-LE less effective in "ensuring that the use of farmland does not change". This fact further supports hypothesis H$_2$. Moreover, according to the "credibility thesis" [59], the function of a system ultimately determines its performance, not its form. Obviously, the FCP-LE follow the same underlying logic: the functions performed by the FCP-LE are subjectively perceived and are thus differently perceived by farmers depending on time and place. Once farmers perceive the credibility of the FCP-LE, they will support them in practice, and their evaluation and perception of the performance of FCP-LE will increase.

Table 9. Rural households' multidimensional perceptions of the performance of FCP-LE.

Evaluation Aspects (%)	Chengdu					Dongguan				
	Very Poor	Poor	Fair	Good	Excellent	Very Poor	Poor	Fair	Good	Excellent
Slowing down the reduction of farmland area	1.13	4.25	26.06	36.83	31.73	0.66	13.16	53.62	29.93	2.63
Ensuring that the use of farmland does not change	1.13	6.80	32.58	31.44	28.05	0.00	12.17	58.88	27.30	1.64
Increasing the grain yield per area	1.98	6.52	36.54	31.73	23.23	0.00	11.84	50.99	32.89	4.28
Increasing the effective irrigation area	2.55	4.82	42.49	30.88	19.26	0.00	15.46	55.59	24.34	4.61
Increasing the recycling rate of mulch film	2.55	3.97	52.97	30.88	9.63	0.00	18.09	58.22	21.38	2.30
Reducing the use of pesticides and fertilizers per area	1.70	7.93	39.38	32.58	18.41	0.00	15.79	55.92	25.66	2.63

4.2.3. Influencing Factors

We further analyzed the factors that affect farmers' perceptions of FCP-LE performance to provide a reference for adjusting and improving farmland conservation policies. We use the dependent variable y to represent farmers' subjective perceptions of FCP-LE. The question "What do you think about the effectiveness of farmland conservation at the village level after implementation of FCP-LE?" helped us obtain the dependent variable. The question has three options, namely, "poor effect", "fair effect" and "greater effect", whereby the dependent variable y is classified into three levels. Among them, "poor effect" is assigned a value of 1, "fair effect" is assigned a value of 2, and "greater effect" is assigned a value of 3, which is an ordinal variable; therefore, we used an ordered logit (Ologit) model to explore the factors affecting farmers' perceptions of FCP-LE performance.

According to Table 10, there are both similarities and differences in the factors affecting farmers' perceptions of FCP-LE performance. In general, *LAB_ratio* and *CONG* significantly and positively affect farmers' perceptions of FCP-LE performance in both Chengdu, which implemented FCP-LE$_{f/ms}$, and Dongguan, which implemented FCP-LE$_{c/m}$. In addition to the common influencing factors above, there are regional differences between influencing factors. *UND* affects farmers' perceptions of FCP-LE performance only in Dongguan.

Table 10. Results of Ologit regression.

Variables	Chengdu		Dongguan	
	Coef.	S.E.	Coef.	S.E.
AGE	0.011	0.013	−0.009	0.038
EDU	0.023	0.058	−0.158	0.157
VIL_cadre	−0.101	0.337	0.551	0.864
CTTE_trust	0.021	0.126	0.007	0.463
LAB_ratio	0.890 *	0.473	4.675 **	2.022
INC_household	0.007	0.020	0.014	0.043
AINC_ratio	−0.096	0.349	1.048	1.498
CONG	1.023 *	0.215	2.818 ***	0.827
UND	−0.077	0.152	0.949 ***	0.367
LOC	0.111	0.277	−0.028	0.827
Cut1	−1.080	1.314	4.471	3.955
Cut2	4.350	1.237	15.534	4.422
Obs	353		304	
LR chi^2	31.72		46.42	
Pseudo-R^2	0.0624		0.3563	

Note: *, **, ***: significance at the 10%, 5% and 1% levels.

As the estimated coefficients derived from the Ologit model do not directly account for the magnitude of the effects of each influencing factor on the dependent variable, we further analyzed the marginal effects of each influencing factor on the dependent variable (Table 11). The results showed that the *LAB_ratio* and *CONG* had significant effects on the value of y in Chengdu. Among them, the marginal effect of the influence factor *LAB_ratio* is −0.1890 for "y = 2" and 0.1964 for "y = 3", both of which are significant at the 10% level. This means that as the *LAB_ratio* increases by one unit, the probability of farmers considering FCP-LE to have had a "fair effect" decreases by 18.9%, whereas the probability of farmers considering FCP-LE to have had a "greater effect" increases by 19.64%. Moreover, the marginal effect of *CONG* on "y = 1" and "y = 2" is negative and significant at 10% and 1%, respectively. That is, for increasing each unit of *CONG*, the probability of farmers considering FCP-LE to have had a poor effect" and "fair effect" decreases by 0.85% and 21.72%, respectively. Conversely, *CONG* has a marginal effect of 0.2257 when "y = 3". In Dongguan, *LAB_ratio* and *CONG* also have a significant effect on the value of y; however, different from Chengdu, *UND* is only significantly correlated with y in Dongguan. Other influencing factors are not statistically significant for the value of y; therefore, there is not a significant relationship between other influencing factors and y.

Table 11. Analysis of marginal impact.

Variables	Chengdu			Dongguan		
	y = 1	y = 2	y = 3	y = 1	y = 2	y = 3
AGE	−0.0001	−0.0022	0.0023	0.0001	0.0001	−0.0002
EDU	−0.0002	−0.0049	0.0051	0.0019	0.0016	−0.0035
VIL_cadre	0.0008	0.0215	−0.0224	−0.0065	−0.0057	0.0122
CTTE_trust	−0.0002	−0.0045	0.0047	−0.0001	−0.0001	0.0002
LAB_ratio	−0.0074	−0.1890 *	0.1964 *	−0.0552 *	−0.0487	0.1039 **

Table 11. *Cont.*

Variables	Chengdu			Dongguan		
	y = 1	y = 2	y = 3	y = 1	y = 2	y = 3
INC_household	−0.0001	−0.0015	0.0016	−0.0002	−0.0001	0.0003
AINC_ratio	0.0008	0.0204	−0.0212	−0.0124	−0.0109	0.0233
CONG	−0.0085 *	−0.2172 ***	0.2257 ***	−0.0333 **	−0.0294	0.0626 ***
UND	0.0006	0.0163	−0.0169	−0.0112 *	−0.0099	0.0211 ***
LOC	−0.0009	−0.0236	0.0245	0.0003	0.0003	−0.0006

Note: *, **, ***: significance at the 10%, 5% and 1% levels.

5. Discussion

5.1. Differences Exist in the Performance of Farmland Conservation Policies Using Different Policy Instruments

An accurate understanding of the types of policy instruments that are involved in the process of public policy implementation and the selection of appropriate policy instruments are essential for the successful realization of public policy objectives [60]. What is the effect of farmland conservation after economic incentive policy instruments intervene in the field of farmland conservation and are combined with command-and-control policy instruments? Additionally, are there heterogeneous effects that emerge from the adoption of different economic incentive policy instruments on the performance of farmland conservation policies? There are two main findings in our study that help answer these questions.

First, our findings provide evidence for the point of view [20] that after adopting different policy instruments, areas that face the same task of farmland conservation produce significant differences in terms of the effects of farmland conservation. In addition, Chen (2021) and Baylis (2008) both believed that command-and-control policy instruments play an important role in controlling the amount of farmland, although they have different views on the impact that economic incentive policy instruments have on the effect of farmland conservation [6,61]. More specifically, Chen (2021) found that economic incentive policy instruments can improve the quality of farmland [6], whereas Baylis (2008) believed that economic incentive policy instruments have obvious effects on ensuring the quality of farmland and improving ecosystem services. In any case, they both indicate that using multiple policy instruments is far more effective than relying upon a single policy instrument, because these policy instruments can reinforce and complement each other. Our findings are consistent with the above conclusions. Compared with that of un-LPA, the performance level of farmland conservation policies in LPA is significantly higher when the economic incentive and command-and-control policy instruments are comprehensively adopted. Moreover, the performance values of farmland conservation policies are distributed from highest to lowest in Chengdu, Dongguan, and Wuhan. This result indicates that the different policy arrangements that result from the selection and combination of different farmland conservation policy instruments can have different degrees of impact on the performance of farmland conservation policies.

Second, since the participation of citizens and other stakeholders has often been identified as a key element for the success of open space conservation [62], including farmland, incentives need to be given to those who make real efforts to conserve farmland. Some studies show that it may be more effective to pay more compensation to farmland users [63,64]. If economic incentives are not matched by farmers' efforts, dissatisfaction and demotivation will arise, particularly among low-paid farmers [65]. This implies that if farmers, the actual executors of cultivated land protection, can receive appropriate economic incentives, the performance of farmland conservation policies will be effectively improved. The results of our research clearly support the above viewpoint because we obtained results stipulating that there are differences between the performances of farmland conservation policies in LPA where the compensation recipients and compensation patterns

are different. The performance of farmland conservation is significantly better in areas that adopt FCP-LE$_{f/ms}$ than in areas that adopt FCP-LE$_{c/m}$. Although scholars have paid some attention to farmland conservation policy instruments in previous studies, there are few empirical studies on the impact of policy instrument combinations, and the different ways of implementing specific policy instruments, on farmland conservation. Our study adds to this body of literature. Further studies can be conducted with long-term follow-up surveys to explore the dynamics of policy performance in more depth.

5.2. Factors Affecting Farmers' Perceptions of FCP-LE Performance

Regardless of what kinds of FCP-LE were adopted, we found that farmers' perceptions of performance were related to *LAB_ratio* and *CONG*. There may be a reason for this result, given that the larger the *LAB_ratio*, the larger the area of farmland owned by the household [66]. This phenomenon is related to the actual manner in which land is allocated in China, as it is based on the number of household members. At the same time, farmland is still an important production factor and an asset for farmers. Moreover, farmers with sufficient household labor resources are still willing to reserve farmland for agricultural production [67]. Rural households with a higher *LAB_ratio* are more intensely affected by farmland resources, and therefore, they pay more attention to farmland conservation. Additionally, LPA mostly issued compensation funds when the farmland area reached a certain standard per mu; in other words, when the farmland resources owned by rural households reach a certain level, the transferred income that is obtained through their participation in farmland conservation can also play a role in supplementing the total household income, thus enabling farmers to intuitively perceive the benefits brought by FCP-LE. Therefore, *LAB_ratio* has a significant impact on farmers' perceptions of FCP-LE performance. Similarly, farmers who have a higher *CONG* generally cherish their own farmland resources and are more motivated to conserve farmland, which, to a certain extent, reduces their resistance to FCP-LE. This finding is consistent with research findings suggesting that the depth of landowners' knowledge of land conservation issues will positively affect their participation in farmland conservation [68]. In comparison, farmers with higher *CONG* will have a clearer understanding of the purpose of implementing FCP-LE, and thus, they can correctly recognize the importance of FCP-LE in farmland conservation work. As a result, they feel more deeply about the changes brought about by the implementation of FCP-LE, and they believe that FCP-LE have a higher probability of having a greater impact. In other words, the lack of understanding of the importance of farmland conservation also affects farmers' active participation in farmland conservation. Even if compensation funds are granted, the farmers' subjective evaluations of FCP-LE performance is reduced due to their lack of attention on farmland resources.

In addition to the common factors mentioned above, the cognitive characteristic, *UND*, only had a significant effect on farmers' perceptions of FCP-LE performance in Dongguan, and this result still held after robustness tests. A field survey found that the economy of Dongguan is relatively developed, and the dependence of farmers on agriculture is lower than that of farmers in Chengdu. At present, most young and middle-aged laborers in the rural areas of Dongguan choose to find work off the farm, and it is more common for household members with lower educational levels and higher age levels to live in their current place of residence for a long time. Compared with other household members, these groups of farmers can more clearly and intuitively feel the changes brought about by FCP-LE, and their understanding of FCP-LE is also more profound. Once they perceive the various benefits provided by the farmland ecosystem, they are more inclined to believe that FCP-LE will be more effective. Furthermore, in future studies, it will be necessary to conduct a multidimensional analysis of the factors that affect farmers' perceptions of FCP-LE performance. Internal factors, such as the individual, household, and the cognitive characteristics of farmers at the microlevel, should be considered, and external factors at the macrolevel, such as the type of industry in LPA, should also be taken into account.

6. Conclusions

The performance of farmland conservation policy is very important for maintaining food security and social stability, especially in developing countries, including China. The application of different policy instruments of farmland conservation usually leads to differentiated policy performances. To date, the effects of different types of policy instrument on the performance of farmland conservation policies are difficult to identify and compare. This issue brings challenges to differentiated policy-making with regard to conserving farmland.

First, this study constructed a conceptual analysis framework that defined two types of areas according to whether FCP-LE are implemented, and then it analyzed the performance of different farmland conservation policies. On this basis, quantitative empirical evidence was obtained based on the perspective of farmers' perceptions, and Chengdu, Dongguan, and Wuhan in China, were used as the study areas. According to the results, the effects of farmland conservation vary significantly depending on which farmland conservation policy instruments are used. The combination of economic incentive and command-and-control policy instruments is significantly more effective than the single command-and-control policy instrument in improving the performance of farmland conservation policies, and they can promote a significant 20.1% increase in the performance of such policies. Furthermore, there are some differences between the performances of farmland conservation policies in LPA that have adopted different economic incentive policy instruments. Among them, the performance of farmland conservation policies achieved in areas that adopted FCP-LE$_{f/ms}$ is significantly higher than that of areas that adopted FCP-LE$_{c/m}$. Additionally, the factors affecting farmers' perceptions of FCP-LE performance exhibit regional heterogeneity.

We believe that to further improve the effects of farmland conservation, we should pay attention to the key role of FCP-LE in achieving the "trinity" of farmland conservation goals, which are quantity, quality, and ecology. At the same time, FCP-LE should be further adjusted, improved, and promoted nationwide. On this basis, we encourage more un-LPA to combine local farmland resource endowment, the characteristics of farmland use, and the level of socioeconomic development, to explore and innovate farmland conservation policies that can adapt to the development of the region based on local conditions. Moreover, un-LPA should also try to use economic means to stimulate enthusiasm for the main users of farmland to participate in farmland conservation in order to better promote the realization of the public goal of farmland conservation. To promote an improvement in FCP-LE performance, compensation recipients should be those most closely related to the use of farmland. Compared with those who govern the main body of farmland conservation, such as local governments and rural communities, whether from the perspective of the implementation effects of FCP-LE or from a theoretical perspective, the interests of farmers need to be protected in the policy design process. Failing to consider or ignoring farmers' demands and their active participation in farmland conservation will not be conducive to stimulating the intrinsic driving force of farmers in farmland protection, which, in turn, will lead to FCP-LE failing to achieve their greater purpose. At the same time, in the process of implementing FCP-LE, the "one size fits all" compensation pattern should be avoided in different regions. Instead, we should explore diversified patterns of compensation for farmland conservation based on a full understanding of farmers' own needs and preferences.

We believe that the performance evaluation of farmland conservation policy can be carried out from various perspectives. In addition to carrying out the evaluation from the perspective of farmers', as presented in this paper, future research can explore more perspectives using actual data. Changes in quantity, yield potential, and the multiple ecological functions of farmland caused by the implementation of farmland conservation policy may be potential directions for future research.

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