How Did the Land Contract Disputes Evolve? Evidence from the Yangtze River Economic Belt, China

Shukui Tan 1, Bin Tong 1,*, and Junwen Zhang 2

1 College of Public Administration, Huazhong University of Science and Technology, Wuhan 430074, China
2 College of Computer Science and Technology, Wuhan University of Science and Technology, Wuhan 430074, China
* Correspondence: tongbin@hust.edu.cn

Abstract: Land contracting is an important system in China. As we know, farmers and agricultural organizations acquire land management rights from collective economic organizations to carry out agricultural production. Over the past few decades, it has proved to make a huge contribution to food security and agricultural development in China. However, as land values increased, landowners, contractors, and operators were increasingly in competition over land interests and, as a result, the number of land contract disputes has rapidly increased. Land contract disputes are not only involved in social and economic issues but also related to government management and grassroots governance. Studying the temporal and spatial changes of disputes is the premise to deal with this subject. Based on the data of China Judgment Online from 2016 to 2021, this paper used descriptive statistical methods, spatial analysis tools, and Markov Chains to reveal the temporal evolution characteristics, spatial distribution trends, and grade transfer tendency of land contract disputes in the Yangtze River Economic Belt (YEB). The results showed the following: (1) From 2016 to 2021, the number of land contract disputes in the YEB increased sharply and then decreased gradually; (2) In terms of spatial distribution, land contract disputes were significantly clustered, and the level of clustering has increased in volatility. Meanwhile, the agglomeration area has continuously transferred; (3) There existed the “club convergence effect” and “spatial spillover effect” in the process of dispute grade transfer, but the overall trend was to change for the better. This study attempted to comprehensively describe the changes in land contract disputes in the YEB, and the results would serve as a useful reference for relevant regions to explore the differentiated paths to deal with land contract disputes.

Keywords: land contract disputes; distribution; evolution; Markov chain; Yangtze River Economic Belt (YEB)

1. Introduction

Land is the foundation on which farmers depend for their survival. In 1978, the family contract responsibility system for land production was implemented in rural China, which greatly stimulated farmers’ enthusiasm for production. Farmers acquire cultivated land from collective economic organizations to carry out agricultural production, which is called land contracting in a narrow sense. Around 2014, as an important part of China’s land system reform, the system for separating ownership rights, contract rights, and management rights for contracted rural land was proposed and established. Under this system, the degree of agricultural scale operation and the level of agricultural modernization were effectively improved through land transfer.

As a common phenomenon, land contract disputes have attracted the attention of academia. Due to the differences in social systems, land contract disputes are poorly studied in countries other than China, but we can still find some traces in the studies of land conflicts. In the researchers’ view, land disputes can be divided according to different
subjects, such as landowners, governments, and modern land management departments [1]. The specific types of disputes include not only the conflict of the land value-added income distribution but also the conflict of stakeholders’ value pursuits of land use modes [2,3]. For example, Nguyen’s study [4] on Hanoi showed that unequal distribution of compensation proceeds from exacerbated land acquisition disputes between farmers and investors.

Relevant studies in China can be summarized as follows: In terms of research content, early studies mainly explored the causes [5], types [6], and countermeasures [7] of land contract disputes. As for the causes, it is widely believed that land appreciation is the most fundamental reason. Besides, legal adjustments [8], policy conflicts [9], and information asymmetries [10] can also lead to land contract disputes. When it comes to the types of disputes, it is quite common to discuss land ownership disputes, land revenue distribution disputes, land acquisition disputes, and land transfer disputes [11–13]. For countermeasures of disputes, researchers advocate the use of mediation, arbitration, and administrative negotiation to build a pluralistic prevention and resolution mechanism that includes the government, farmers, enterprises, and social organizations [14–16]. With the deepening of research, disputes over the transfer of land contract management rights [17,18] and disputes over the distribution of expropriation compensation costs [19–22] have become hot spots for research. Based on empirical cases, Li [23] proposed that the role and function of judicial governance in rule supply should be played. From a research perspective, they can be divided into two categories, non-litigation disputes [24–26] and litigation disputes. You and Zhang [27] compared two types of disputes arising from the termination and transfer of contracting rights; some scholars do not make the distinction, such as Zhang et al. [28] who have presented some problems of dispute resolution mechanisms in terms of arbitration and litigation. In terms of research methods, case studies [29,30] and empirical studies based on quantitative analysis [31–33] are more common. Researchers [34] usually collected basic data through questionnaires and face-to-face interviews in representative districts (counties) to explore the causes of land contract disputes. Most of the study areas were counties and cities [35,36], while provinces were also involved. Based on a field survey in SY County, Jiangsu, Yu et al. [37] proposed a “holistic” approach to dispute management; Tan et al. [38] used a fixed-effects model to reveal the underlying mechanisms which affect the evolution of land disputes in terms of the urbanization process, property rights system construction and input for dispute resolution; Xia et al. [39] found a gradual increase in the incidence of disputes and a large difference in spatial and temporal distribution. In addition, the role of land ownership, social capital, and household capacity in preventing farmland disputes has also been studied [40]. In addition, against the background of China’s comprehensive rural revitalization strategy, researchers have begun to focus on the interaction between land contract disputes and rural governance [41,42], while other scholars have examined the impact of digital inclusive finance development on rural land contract dispute cases from a cost-benefit and financial equity perspective [43].

The above-mentioned literature has laid a rich theoretical foundation for the study of land contract disputes, but there are still certain shortcomings. Firstly, the research content is highly repetitive, and the study area is fragmented. Previous works mainly focused on counties and cities in different regions to explore the problems and countermeasures of land contract disputes. It is almost ignored that the study of the province and the wider area are equally important. Secondly, there is a lack of a dynamic perspective focusing on land contract disputes. The previous research on the spatial and temporal distribution of disputes was absent, which means the changing patterns of land contract disputes cannot be dynamically understood. How the number of disputes changes, whether the distribution is scattered or concentrated, and what the status is of disputes in particular cities and regions are all significant questions to the study of land contract disputes and even the land contract system, but unfortunately the answers to the above questions are currently lacking. Finally, most studies rely heavily on field surveys to obtain data related
to disputes, which are costly to conduct and analyze and cannot avoid the problem of subjectivity in surveys, and these shortcomings may affect the credibility of surveys and the timeliness of research results.

As a major national strategic development region, as well as one of the most important agricultural production regions, the Yangtze River Economic Belt (YEB) is facing a serious dispute situation. Along with the upgrading of status, economic development, accelerated urbanization, and obvious land appreciation, the problem of disputes arising from the human–land conflict and the still imperfect land system has become increasingly prominent. The increasing frequency of land contract disputes has seriously hurt agricultural production and economic development. Therefore, it is vital to study the spatiotemporal distribution and evolution patterns of land contract disputes in the YEB.

This paper took the YEB as the research area, collected 105,066 litigation cases of land contract disputes during the six years from 2016 to 2021 on China’s Judgment Online, trying to reveal the characteristics of temporal evolution, spatial evolution trends, and hierarchical transfer trends of land contract disputes. With the help of descriptive statistics methods, ArcMap spatial analysis tools, and Markov chains, this paper put forward valuable suggestions based on the research results, aiming to provide a reference for the prevention and resolution of land contract disputes in the YEB.

The possible marginal contribution of this paper is not only to fill the gaps in the study area and to avoid subjectivity in data collection but also to investigate land contract disputes from a dynamic perspective. Firstly, for the topic of land contract disputes, the YEB is representative as a study area. It spans the east, middle, and west of China, with vast differences in economic and social development, and thus the forms and characteristics of land contract disputes vary from area to area. It could be useful to explore the situation and differences in land contract disputes for other regions of China. Secondly, this paper obtained data directly from the judicial case base, which is an improvement to the method of land disputes research. It avoided the subjectivity of questionnaires in previous studies, while the official judicial data could assure the credibility of the study results. Finally, compared with previous studies, this paper filled the gap in research content in the field of land contract disputes by inspecting land contract disputes as dynamic social phenomena. The research content and results would be innovative and unique as they explored the evolution pattern of the number, distribution, and grade of disputes.

2. Materials and Methods
2.1. Study Area and Data
2.1.1. Study Area

As shown in Figure 1, the Yangtze River Economic Belt (YEB) spans eastern, central, and western China, and embraces 11 provinces (or municipalities directly under the central government) including Shanghai, Jiangsu, Zhejiang, Anhui, Jiangxi, Hubei, Hunan, Chongqing, Sichuan, Yunnan, and Guizhou, covering an area of about 2,052,300 square kilometers, accounting for 21.4% of the country. The regional population and GDP share of the country in 2020 is 42.0% and 46.4%. It sustains 54% of the country’s agricultural population with about 26% of the country’s agricultural land area [44]. Data indicate that from 2016 to 2021, the number of land contract disputes in the Yangtze River Economic Zone reached 111,423, which accounted for 33.96% of the national total in the same period. As we can see, the issue of land contract disputes is extremely severe.
This paper covers 11 provinces (including Shanghai and Chongqing) and 182 cities (for the convenience of this study, 16 districts in Shanghai, 38 districts and counties in Chongqing, and Tianmen, Xiantao, Qianjiang, and Shennongjia in Hubei province are uniformly counted as cities in this paper) in the YEB. The maps used in this paper are obtained based on the 1:250,000 China Basic Geographic Database (2019), and the base geographic coordinate system used is CGCS2000.

The data on disputes are obtained from China Judgment Online (https://wenshu.court.gov.cn, accessed on 1 January 2022). The <Judicial Interpretation of Rural Land Contract Disputes Cases> which was released by the Supreme People’s Court (PRC) stipulates that the civil disputes over rural land contracts should be accepted by the people’s courts, and in practice, the two causes of action, “disputes over rural land contract” and “disputes over land contract management rights”, basically encompass the above disputes. Therefore, we first defined the completion date as 1 January 2016–31 December 2021, then set the case type as “civil first instance”, and finally filtered the data of 9 provinces and 182 prefecture-level cities in the YEB by “disputes over land contract” and “disputes over land contract management rights”. By collecting the judgments of the above two causes, we obtained the data related to land contract dispute cases in YEB. Due to the length of the article, we only list the dispute data for nine provinces, as shown in Table 1.

Table 1. The number of land contract disputes in 11 provinces/municipalities in YEB from 2016 to 2021.

<table>
<thead>
<tr>
<th>Province/Municipality</th>
<th>Disputes over Rural Land Contract</th>
<th>Disputes over Land Contract Management Rights</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shanghai</td>
<td>140</td>
<td>176</td>
</tr>
<tr>
<td>Jiangsu</td>
<td>658</td>
<td>742</td>
</tr>
<tr>
<td>Zhejiang</td>
<td>207</td>
<td>276</td>
</tr>
<tr>
<td>Anhui</td>
<td>528</td>
<td>1686</td>
</tr>
<tr>
<td>Jiangxi</td>
<td>113</td>
<td>152</td>
</tr>
<tr>
<td>Hubei</td>
<td>364</td>
<td>1089</td>
</tr>
<tr>
<td>Hunan</td>
<td>155</td>
<td>498</td>
</tr>
<tr>
<td>Chongqing</td>
<td>2561</td>
<td>4909</td>
</tr>
<tr>
<td>Sichuan</td>
<td>1553</td>
<td>3074</td>
</tr>
<tr>
<td>Guizhou</td>
<td>276</td>
<td>429</td>
</tr>
<tr>
<td>Yunnan</td>
<td>664</td>
<td>617</td>
</tr>
<tr>
<td>The YEB</td>
<td>7219</td>
<td>13,608</td>
</tr>
</tbody>
</table>

Figure 1. The Yangtze River Economic Belt (YEB).
2.2. Methods
2.2.1. Descriptive Statistics
Descriptive statistics are used to count and analyze the data of land contract disputes. The number, distribution, and changing trend of dispute cases can be presented visually by drawing bar charts and line graphs.

2.2.2. Spatial Analysis Tools
Moran’s I can be used to study the developmental differences and spatial distribution patterns of things among different regions. As a mature spatial analysis tool, it has been widely used in the fields of geography, economics, demography, and sociology. The use of Moran’s I can effectively analyze the distribution and aggregation of disputes, so we can focus on the real situation of land contract disputes.

We used ArcMap to understand the spatial variation of disputes, specifically, Global Moran’s I and Anselin Local Moran’s I tools were utilized to reveal agglomeration characteristics. Global Moran’s I can measure whether and to what extent the distribution of land contract disputes is correlated with neighboring units. Given the location of the study unit and the number of disputes, the index I (in the range of \([-1, 1]\)) is calculated to measure whether the distribution pattern of disputes is clustered, discrete, or random, and when \(I > 0\), a larger value indicates a higher degree of dispute clustering. Anselin Local Moran’s I can further examine the local clustering and dispersion of land contract disputes by calculating the value \(I_l\) of the difference between the number of land contract disputes in the study unit and neighboring units. \(I_l > 0\) indicates a small difference, which is generally manifested as HH clustering or LL clustering.

The formulae for \(I\) and \(I_l\) are as follows:

\[
I = \frac{n \sum_{i=1}^{n} \sum_{j=1}^{n} w_{ij} z_i z_j}{S_0 \sum_{i=1}^{n} z_i^2} \tag{1}
\]

\[
I_l = \frac{n Z_i \sum_{j=1}^{n} w_{ij} Z_j}{\sum_{i=1}^{n} Z_i^2 \sum_{j=1}^{n} \sum_{j=1}^{n} w_{ij}} \tag{2}
\]

where \(n\) is the number of study units; \(w_{ij}\) is the spatial weight between study units \(i\) and \(j\); \(Z_i\) is the deviation between the number of disputes in unit \(i\) and the average number of disputes in all units, and the same goes for \(Z_j\).

\(S_0\) is the aggregation of all spatial weights. Its calculation formula is as follows:

\[
S_0 = \sum_{i=1}^{n} \sum_{j=1}^{n} w_{ij} \tag{3}
\]

The statistical \(Z_I\) is calculated according to the following formulas:

\[
Z_I = \frac{I - E[I]}{\sqrt{V[I]}} \tag{4}
\]

\[
E[I] = -1/(n - 1) \tag{5}
\]

\[
V[I] = E[I^2] - E[I]^2 \tag{6}
\]

2.2.3. Markov Chain
A Markov chain can reveal the evolution process and direction of research units by constructing a transition probability matrix. In this paper, 182 cities in the YEB are divided into \(k\) levels according to the number of land contract disputes, and by calculating the transfer probability between different levels, the transfer probability matrix can be
constructed. $P_{i-j}$ represents the probability that the study city moves from grade $i$ in year $t$ to grade $j$ in year $t + 1$, and the equation for it can be expressed as:

$$P_{i-j} = \frac{n_{i-j}}{n_i}$$  \hspace{1cm} (7)

where $n_{i-j}$ represents the number of cities transferred from class $i$ to class $j$ during the study period, and $n_i$ represents the total number of cities in dispute class $i$.

The spatial Markov chain considers the spatial adjacency of cities and decomposes the traditional $k \times k$ transition probability matrix into $k \times k \times k$ transition conditional probability matrix under the condition of the spatial lag grade of the initial year [46].

3. Results

3.1. Overall Distribution

3.1.1. Regional Distribution

In ArcMap10.7, 11 provinces and 182 cities were classified into 5 levels based on the number of land contract disputes by natural breaks (Jenks), as shown in Figure 2.

![Figure 2](image-url)

Figure 2. The distribution of land contract disputes in the YEB from 2016 to 2021. Subfigure (a) reported the distribution of land contract disputes in 11 provinces/municipalities; subfigure (b) reported the distribution of land contract disputes in 182 cities.
As can be seen from Figure 2a, land contract disputes show a distribution trend of high in the upstream and downstream, as well as low in the midstream. Upstream regions (including Chongqing, Sichuan, Guizhou, and Yunnan) had the highest number of disputes, accounting for more than 54% of the total, followed by downstream regions (including Shanghai, Jiangsu, Zhejiang, and Anhui) with about 29%, and midstream regions (including Jiangxi, Hubei, and Hunan) with the least, accounting for only about 17%. The reasons may be that in the relatively underdeveloped middle and upper reaches, land is more important to farmers, and the struggle for land rights and interests is paid more attention. Coupled with the low educational level and legal awareness, land contract disputes are more prominent.

3.1.2. Provincial Distribution

Similarly, the top three in the number of land contract disputes are Chongqing, Sichuan, and Anhui, which together account for more than 50% of the total. Chongqing has the highest number, reaching almost 1/4 of the regional total, which is the most frequent area of land contract disputes in the YEB. Chongqing is one of the economic centers in western China and urbanization is accelerating, yet the agricultural population is still large, and the arable land is relatively fragmented; thus, the number of disputes remains high. Provinces with a low number of disputes include Shanghai, Jiangxi, and Zhejiang, all accounting for less than 5%. Shanghai accounts for only about 1%, with several fewer than 200 cases per year, which is not unrelated to its smaller area and a higher level of urbanization. For Zhejiang, the agricultural economy does not account for a high proportion of GDP, while the reform of the rural property rights system has been completed; at the same time, as found in a previous study, a sound grassroots governance system has resolved most land contract disputes through mediation and arbitration [47].

3.1.3. Municipal Distribution

According to Figure 2b, the distribution pattern shows a “unipolar” located in the adjacent areas of Sichuan, Chongqing, Yunnan, and Guizhou provinces (cities). The region accounts for more than half of the 30 cities with more than 1000 disputes. Jiangjin has the highest number of disputes at 3055, while the rest of the cities with high numbers are scattered in central Anhui, northern Jiangsu, and southern Hunan. The cities with fewer disputes are mainly located in Shanghai, northern Jiangxi, and parts of Hubei. For the low number of disputes in Shanghai’s subordinate districts, such as Huangpu and Xuhui, there are no other reasons than the small land area and the high level of urbanization. While for the other cities, the reasons may include fewer farmers, less arable land area, and even the movement of labor to large cities.

3.2. Time-Series Evolutionary Characteristics

(1) Figure 3 depicts the trend of the number of land contract disputes in the Yangtze River Economic Belt and each provincial unit from 2016 to 2021. It can be seen that the number of disputes in the YEB first increased during 2016–2018 and then decreased during 2019–2021. In 2017, the number increased by 66.49% compared to the previous year, which implies that disputes in the YEB may have been significantly driven. From 2018 to 2021, the number of disputes descended continuously, with decline rates of 15.62%, 20.72%, and 57.63%. The result corroborates with previous studies [38] and is sufficient to prove that the frequent occurrence of land contract disputes in the YEB is gradually improving.
When it comes to each province, the interannual variations were not completely synchronized. Among the 11 provinces, only Jiangxi and Chongqing have the same interannual variation as the whole. In Hubei and Sichuan, the number of disputes increased during 2016–2017 but decreased continuously during 2017–2021, while the fluctuation of the remaining 7 provinces fully indicated that the change in the number of land contract disputes in the YEB is different between provinces.

In terms of decline rate, Yunnan, Chongqing, and Zhejiang were the top three, with a decline of more than 60%. The other provinces (except Hunan) experienced a decline of 25.73–55.98%. This indicates that the government has made significant efforts in recent years to reform the property rights system and build a legal society. Hunan was the only province with a negative decline, although the number of disputes declined continuously from 2019 to 2021, and the number in 2021 was still about 27.02% higher than in 2016. This shows that the number of land contract disputes in some provinces still has some room to decline.

(2) Figure 4 reflects the changes in the distribution proportion of land contract disputes in the upper, middle, and lower reaches of the YEB.

![Figure 3](image_url)

**Figure 3.** The variation of land contract disputes in the YEB from 2016 to 2021.

![Figure 4](image_url)

**Figure 4.** The proportion of land contract disputes in the YEB from 2016 to 2021.
It can be seen that the proportion of the upper reaches increased first and then decreased. From 2016 to 2018, the proportion of the upper reaches increased from 56.74% to 60.33% and then experienced a significant continuous decline. When it comes to 2021, the proportion dropped to 40.35%. The decrease in the proportion indicates that the frequent occurrence of land contract disputes has been effectively contained in the upper reaches. The proportion of the middle reaches increased from 13.80% in 2016 to 23.13% in 2021, although it declined slightly in 2018, the overall upward trend has not changed. In other words, the number of disputes has been declining for five years, but its decline rate may not be prominent from a horizontal perspective. The proportion of the lower reaches decreased first and then increased; it dropped from 29.46% to 24.69% between 2016 to 2018 and then began to rise. In 2021, the number was 36.52%.

In conclusion, during the study period, the variation trend of land contract disputes in the upper, middle, and lower reaches of the YEB was consistent with the overall trend. However, the decrease in the number of disputes was greater in the upper reaches (63.52%) than in the lower reaches (36.40%) and the middle reaches (14.01%), which indicated that the quantity distribution of land contract disputes was gradually balanced.

3.3. Spatial Evolution Trend
3.3.1. Agglomeration Distribution

Some scholars have shown differences in the incidence of land disputes among provinces based on nationwide surveys and have pointed out that land disputes are mainly concentrated in agriculture-based provinces [39]. However, questions such as what the situation at the municipal level is and what the exact level of concentration is remain unanswered. Spatial autocorrelation was used to investigate the agglomeration effect and change of land contract disputes at the level of cities from 2016 to 2021. In ArcMap10.7, 182 cities and the number of disputes in each year were taken as input factors and input fields, and the Inverse Distance and Euclidean Distance defined the spatial relationship of factors by default. The results of spatial autocorrelation analysis were obtained, as shown in Table 2.

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<tbody>
<tr>
<td>I</td>
<td>0.148</td>
<td>0.275</td>
<td>0.273</td>
<td>0.287</td>
<td>0.310</td>
<td>0.291</td>
<td>0.337</td>
</tr>
<tr>
<td>z score</td>
<td>3.084</td>
<td>5.462</td>
<td>5.517</td>
<td>5.664</td>
<td>6.025</td>
<td>5.762</td>
<td>9.819</td>
</tr>
<tr>
<td>p-value</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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</tbody>
</table>

In addition, we used GeoDa 1.20 software to make Moran’s I scatter plots (Figure 5). It can be seen that there are significant differences in the distribution of units in different quadrants, indicating that land contract disputes have obvious agglomeration distribution characteristics.

From Figure 5 and Table 2, the spatial autocorrelation index (I) of each year and the whole research period is greater than 0, and all pass the significance test with z > 2.58 and p < 0.01, indicating that the distribution of land contract disputes in the YEB is not random but has a significant (99% confidence) agglomeration feature. In general, the change of I can be divided into two stages: 2016–2017 was a sharp rise stage, and the value of I almost doubled from 0.148 to 0.275, which means that compared with 2016, the agglomeration distribution of disputes in 2017 was significantly enhanced. The period from 2017 to 2021 was the rising stage of fluctuation, with the value of I rising from 0.275 in 2017 to 0.291 in 2021. During this period, it once reached a peak value of 0.310 in 2020. Based on this, there exists fluctuation for the value of I, but the overall upward trend reflects that the cluster level of land contract disputes in the YEB is still in a strengthened state. This means that in the coming period, land contract disputes will become increasingly concentrated, and in areas where they are concentrated, the pressure on the courts to litigate will continue to rise.
Table 2. Moran’s I of land contract disputes in the YEB from 2016 to 2021.

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Figure 5. Moran’s I scatter plots of land contract disputes in 182 cities.

3.3.2. Agglomeration Pattern

To further reveal the evolution trend of land contract disputes in certain areas of the YEB, clustering, and outlier analysis tools were used to draw the clustering distribution map from 2016 to 2021, as shown in Figure 6. Obviously, with time, the pattern of dispute agglomeration changes constantly.

(1) Aggregation of HH

According to Figure 6a–c, the HH agglomeration areas showed a “single core” distribution from 2016 to 2018, mainly concentrated in the southeast of Sichuan, northeast of Yunnan, north of Guizhou, and part of Chongqing. In 2019, another HH agglomeration area was formed in northern Anhui and northern Jiangsu, the HH agglomeration area showed a “dual-core” distribution. From 2019 to 2021(Figure 6d,e), the HH agglomeration areas in lower reaches continued to spread to central Anhui and central Jiangsu, and the number of cities involved increased from 10 to 14. At the same time, the range of HH clustering areas in the upstream continued to shrink, and the number of cities involved decreased from 9 to 3. By 2021, HH agglomeration showed “single core and scattered distribution”. The “single core” was distributed in most of Anhui and northern Jiangsu, involving 14 cities; the “scatter” was interspersed in western Guizhou, northeastern Yunnan, and some cities in Hunan.

(2) Aggregation of LL

Similarly, from 2016 to 2017, the LL agglomeration showed a “dual-core” distribution, with one located in Shanghai and the northern Zhejiang province, and the other located in the central and eastern Hubei province and the northern Jiangxi province. In 2018, the LL agglomeration pattern evolved into a “plot and strip” distribution, with the number of cities reduced from 35 to 25. The “plot” distribution was in Shangrao and Ji’an in Jiangxi, and the “strip” was in some cities in Shanghai, Zhejiang, and Jiangsu. From 2019 to 2020, the LL
agglomeration pattern re-educates into a “dual-core” distribution, with one still located in Shanghai and northern Zhejiang while the other gradually transfers to south-central Jiangxi. By 2021, LL agglomeration evolved into a “multi-strip” distribution pattern. One extended southwest from Jingmen and Xiangyang in the west of Hubei to the west of Chongqing which involved 26 cities; the other spread southwest from Shanghai and northern Zhejiang to the northeast of Jiangxi, involving 24 cities. The LL agglomeration area also includes Nujiang and Dali.

Generally speaking, from 2016 to 2021, the HH agglomeration areas gradually moved from the upper reaches to the lower reaches, while the LL agglomeration area spread from the middle and lower reaches to the middle and upper reaches. The evolution of the agglomeration pattern reveals the statistically significant distribution trend of land contract disputes in the YEB, which can provide a reference for curbing the frequent occurrence of disputes in related cities.

Figure 6. The agglomeration pattern of land contract disputes in 182 cities in the YEB.
3.4. Trend of Grade Transfer

3.4.1. Traditional Markov Transition Probability Matrix

Firstly, based on the method of natural breaks, we divided 182 cities into five grades according to the number of land contract disputes each year, which are represented by Roman numerals I, II, III, IV, and V, respectively. A larger number means a higher grade, which indicates that the number of disputes is relatively higher, and then the Markov chain is used to calculate the transfer probability between different grades. Table 3 reports the grade transfer matrix obtained based on the traditional Markov chain, in which the first column represents the initial grade of each city, and the remaining columns represent the probability of the transfer between each grade.

(1) Without considering the spatial geographic factors, the high values of transfer probability are distributed on the diagonal line (upper left to lower right, the same as below), indicating that there is a “club convergence effect” in the transfer of land contract dispute grades. In a word, the dispute grades tend to maintain the original grades, but this tendency is weakened as the grades increase, such as $P_{I-II}(0.779) > P_{II-II}(0.519) > P_{III-III}(0.319) > P_{IV-IV}(0.281) > P_{V-V}(0.240)$.

(2) The numerical sum of the diagonal line on the left side is significantly higher than the right, such as grade III downward transfer probability ($P_{III-I} + P_{III-II}$) is 0.489, significantly greater than the probability of upward transfer ($P_{III-IV} + P_{III-V}$) with 0.191. The probability of a downward transfer of dispute grade is higher than that of an upward transfer, which shows that the frequent situation of land contract disputes in the YEB tends to improve.

(3) From the perspective of the downward transfer, the probability of grades II, III, IV and V being transferred to grade I decreased successively, as it can be seen, $P_{II-I}(0.188) > P_{III-I}(0.106) > P_{IV-I}(0.079) > P_{V-I}(0.040)$. Likewise, the probability of grade V transferring to grades IV, III, II, and I also shows a decreasing trend, which indicates that the grade of land contract disputes is difficult to achieve by leapfrog downward transfer, and the decrease in the number of land contract disputes is a gradual process.

### Table 3. Traditional Markov transition probability matrix of land contract dispute grades in 182 cities in the YEB from 2016 to 2021.

<table>
<thead>
<tr>
<th>t/t+1</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>0.779</td>
<td>0.154</td>
<td>0.039</td>
<td>0.021</td>
<td>0.008</td>
</tr>
<tr>
<td>II</td>
<td>0.188</td>
<td>0.519</td>
<td>0.211</td>
<td>0.064</td>
<td>0.019</td>
</tr>
<tr>
<td>III</td>
<td>0.106</td>
<td>0.383</td>
<td>0.319</td>
<td>0.156</td>
<td>0.035</td>
</tr>
<tr>
<td>IV</td>
<td>0.079</td>
<td>0.236</td>
<td>0.281</td>
<td>0.281</td>
<td>0.124</td>
</tr>
<tr>
<td>V</td>
<td>0.040</td>
<td>0.160</td>
<td>0.120</td>
<td>0.440</td>
<td>0.240</td>
</tr>
</tbody>
</table>

3.4.2. Spatial Markov Transition Probability Matrix

To further investigate the influence of spatial adjacency background on the grade transfer of land contract disputes, the Queen adjacency weight matrix was introduced into GeoDa 1.20 software to calculate the spatial lag value of each city, which was also divided into 5 grades according to the method of natural breaks. Based on the traditional Markov transition probability matrix, the paper takes into account the spatial lag grade of the city in the initial year to construct the spatial Markov transition probability matrix (Table 4).

By comparing Tables 3 and 4, it is found that:

(1) Spatial adjacency has a significant influence on the transfer of dispute grades. For example, in the traditional transfer probability matrix, $P_{II-II} = 0.154$, when it comes to the spatial lag classes I, II, III, IV, and V, the transfer probability is 0.128, 0.165, 0.214, 0.103, and 0.118, respectively. This shows that different spatial lag conditions have different effects on the dispute grade transfer.

(2) For the spatial lag grade I, it is obvious that $P_{I-I}(0.789) > P_{I-II}(0.779)$. Similarly, $P_{II-II/II}(0.535) > P_{I-II}(0.519)$, which manifests that the inertia of class I and class II has
been enhanced to maintain the initial grade under the spatial lag condition. However, for grades III and IV, the probability of maintaining the initial grade has a slight decline: \( P_{\text{III-III}}(0.311) < P_{\text{III-III}}(0.319), P_{\text{IV-IV}}(0.188) < P_{\text{IV-IV}}(0.281) \). In summary, under the spatial lag condition, the “club convergence effect” has the characteristics of “low-grade enhanced, high-grade weakened”, that is, cities of lower grade tend to be stable, while cities of higher grade tend to transfer.

(3) Generally speaking, cities with lower dispute grades have a positive spillover effect, which increases the probability of driving the downward transfer of adjacent cities. Under the condition of lagging grade I, for example, there are \( P_{\text{II-I}}(0.250) > P_{\text{II-I}}(0.188), P_{\text{III-II}}(0.423) > P_{\text{III-II}}(0.383) \). Cities with higher dispute grades have a negative spillover effect which means that neighboring cities tend to transfer upward. For example, when spatial lag conditions are not considered, the total probability of an upward transition of grade I is 0.221, but when spatial lag grades are II, III, and V, the probability of upward transition is correspondingly increased to 0.223, 0.262, and 0.295. The result shows that there is a spatial spillover effect of “near to high, tend to be high; vice versa”.

Table 4. Spatial Markov transition probability matrix of land contract disputes grade in 182 cities in the YEB from 2016 to 2021.

<table>
<thead>
<tr>
<th>Spatial Lag Grade</th>
<th>t/t + 1</th>
<th></th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>109</td>
<td>0.789</td>
<td>0.128</td>
<td>0.046</td>
<td>0.018</td>
<td>0.018</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>52</td>
<td>0.250</td>
<td>0.481</td>
<td>0.154</td>
<td>0.058</td>
<td>0.058</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>26</td>
<td>0.038</td>
<td>0.423</td>
<td>0.385</td>
<td>0.154</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>16</td>
<td>0.125</td>
<td>0.313</td>
<td>0.250</td>
<td>0.250</td>
<td>0.063</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>5</td>
<td>0.200</td>
<td>0.200</td>
<td>0.000</td>
<td>0.200</td>
<td>0.400</td>
<td></td>
</tr>
<tr>
<td>II</td>
<td>121</td>
<td>0.777</td>
<td>0.165</td>
<td>0.033</td>
<td>0.025</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>86</td>
<td>0.209</td>
<td>0.535</td>
<td>0.198</td>
<td>0.047</td>
<td>0.012</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>50</td>
<td>0.160</td>
<td>0.420</td>
<td>0.340</td>
<td>0.080</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>21</td>
<td>0.048</td>
<td>0.095</td>
<td>0.381</td>
<td>0.333</td>
<td>0.143</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>9</td>
<td>0.000</td>
<td>0.333</td>
<td>0.333</td>
<td>0.111</td>
<td>0.222</td>
<td></td>
</tr>
<tr>
<td>III</td>
<td>84</td>
<td>0.738</td>
<td>0.214</td>
<td>0.048</td>
<td>0.000</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>80</td>
<td>0.113</td>
<td>0.525</td>
<td>0.263</td>
<td>0.088</td>
<td>0.013</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>45</td>
<td>0.111</td>
<td>0.289</td>
<td>0.311</td>
<td>0.178</td>
<td>0.111</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>33</td>
<td>0.091</td>
<td>0.242</td>
<td>0.212</td>
<td>0.333</td>
<td>0.121</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>8</td>
<td>0.000</td>
<td>0.000</td>
<td>0.125</td>
<td>0.625</td>
<td>0.250</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>58</td>
<td>0.845</td>
<td>0.103</td>
<td>0.017</td>
<td>0.034</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>33</td>
<td>0.212</td>
<td>0.515</td>
<td>0.242</td>
<td>0.030</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>13</td>
<td>0.077</td>
<td>0.385</td>
<td>0.231</td>
<td>0.308</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>16</td>
<td>0.063</td>
<td>0.375</td>
<td>0.250</td>
<td>0.188</td>
<td>0.125</td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>3</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>1.000</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>

On the whole, the positive effect of “near to low, tend to be low” is stronger than the negative effect of “near to high, tend to be high”. Therefore, the grade of land contract disputes in the YEB generally converges in a downward direction. However, affected by the number of research cities and abnormal values, there are differences in two-way spillover effects under different spatial lag conditions. The transfer of dispute grade has a certain risk of “swing”. For example, without considering the spatial lag condition, the probability of downward transition of grade V is 0.760, which changes to 0.400, 0.778, 0.750, 1.000, and 0.750 for spatial lag types I, II, III, IV, and V. This is obviously not exactly matching
the spatial spillover effect. Due to the small number of cities with a dispute grade V, this probability is not statistically significant. Similarly, we take the probability of upward transition of grade II as an example; without considering the spatial lag condition, the probability of upward transition of grade II is 0.294, which decreases to 0.272 and 0.266 when lag conditions IV and V are introduced. This is also inconsistent with the negative effect of “near to high, tend to be high”. In summary, uncertainty about dispute grade transfer does exist, and the exploration of the causes requires more sophisticated work.

4. Discussion

4.1. Comparison and Limitations

This paper revealed the distribution, spatial-temporal pattern, and evolution of disputes grade by using descriptive statistical methods, spatial analysis tools, and the Markov chain. The main results of our research are consistent with previous studies. For example, some studies have shown that areas based on agriculture also usually have higher rates of land disputes [48]. A specific study showed that the average incidence of land contract disputes in Jilin, Sichuan, and Jiangsu was as high as 17.24% [49]. Furthermore, in our results, Sichuan, a large agricultural province, has validated this view. The study, also targeting the Yangtze River Economic Belt as a region, showed that land disputes have been improving consistently from 2011 to 2020 [38]; the western region is higher than the eastern region in terms of the number of land disputes [50]. Compared to these previous studies, this study focuses on land contract disputes, which can refine our understanding of land disputes and enrich our knowledge of their evolution. Combining spatial distribution and grade transfer will help predict the development trend of land contract disputes and help make more accurate policy recommendations to prevent disputes. It should be noted that different statistical methods will lead to different research results. In this paper, we defined the scope of land contract disputes according to official documents, then carried out further research. Nevertheless, there may still be some cases missing which may have a slight influence on the conclusion of this paper. On the one hand, being limited by the availability of sample cases and the relatively short duration of this paper, from 2016 to 2021, means that the trends may not be convincing; on the other hand, this paper explores disputes only at the provincial and municipal levels and does not go deeper into the county level. Whether it is the occurrence, prevention, or resolution of disputes, the county is the most important basic unit. Therefore, the exploration of these issues mentioned above in this study is quite limited.

4.2. Future Work and Policy Recommendation

Although researchers pay more attention to land contract disputes, it is still lacking to analyze them with big data, which should be further studied in the future. First, we plan to further explore the distribution of land contract disputes in counties, which may provide new evidence on the clustering characteristics of disputes; second, it will be necessary to investigate the causes of the differences in the distribution and evolution patterns of land contract disputes [51,52], and only on this basis can we provide governments with implementable response strategies; then, this study will attempt to examine national land contract disputes with a broader perspective. Finally, researchers are increasingly interested in combining land dispute governance with grassroots governance and exploring the interaction between the two [41,42], and we will also conduct future research to provide ideas for governments or grassroots governors in the countries and regions concerned. Different forms of land disputes or land conflicts are prevalent in the world, especially in developing countries [53,54]. How to face and manage this problem is a long-term topic. This paper tries to provide a reference for the countries concerned by studying the evolution pattern of land disputes in China. In future research, we will also focus on the mechanism and performance of land contract dispute governance, which will undoubtedly provide ideas for developing countries to deal with land disputes.
Based on the above research findings, this paper put forward the following policy-oriented recommendations:

(1) The government can explore the differentiated path to improve the situation of land contract disputes, bring into play the exemplary role of traditional LL agglomeration areas such as Zhejiang and Jiangxi, and, furthermore, summarize experience and practice in time and carry out pilot promotion. Policy guidance for the HH agglomeration cities can be strengthened. For Anhui and Jiangsu, using policy tools to curb the further proliferation of HH agglomerations would be a necessary path. For Sichuan and Guizhou, the local government should ensure the dispute prevention and resolution input while carrying out regular inspections to prevent a large rebound in the number of disputes. Hunan should adjust relevant policies promptly to avoid the risk of further concentration in the HH agglomeration.

(2) Exchanges and cooperation in the prevention and resolution of land contract disputes should be consolidated, which will promote the development of regional synergy in the YEB to a deeper level. The regional synergy barriers caused by administrative districts should be broken down. Cities with lower dispute grades should be actively guided to bring into play positive spillover effects through project cooperation, thus leading to a downward transfer in dispute grades of neighboring cities aiming to weaken the “club convergence effect” of higher-grade cities in disputes and accelerate their downward transfer by using policy forces.

(3) Local governments should pay more attention to land contract disputes, including establishing a supervision platform for the disputes in the YEB and regularly disclosing the changing situation, structural composition, and spatial distribution of disputes with the help of big data tools. A red line for early warning of the number of disputes should be established, and the relevant resources to consolidate the good situation of current land contract disputes should be rationally allocated.

As mentioned by many researchers, to improve the current situation of land contract disputes, it is necessary to increase the publicity of land transfer policies and the investment in the construction of the rule of law at the grassroots level. This paper emphasizes the use of big data and information technology to build a system for preventing and resolving land contract disputes, and the relevant recommendations are intended to provide a reference for local governments.

5. Conclusions

This paper constructed a database of land contract disputes in 11 provinces and 182 cities in the Yangtze River Economic Belt (YEB) from 2016 to 2021 and revealed the distribution, spatial-temporal pattern, and evolution of disputes grade by using descriptive statistical methods, spatial analysis tools, and Markov chains. The main conclusions of the study are as follows:

(1) The distribution of land contract disputes in the YEB was significantly different. From the perspective of the region, “the upper reaches are high, the lower reaches are second, and the middle reaches are the lowest”. When it comes to provinces, Chongqing had the highest while Shanghai had the lowest number of disputes, and the former was about 21 times that of the latter. At the city level, the disputes showed a “unipolar” pattern which was concentrated in Jiangjin, Tongnan, and Nanchuan.

(2) The number of land contract disputes in the YEB is decreasing, but the inter-annual variation of provinces was different and fluctuated. In terms of the decline rate, all provinces (except Hunan) have experienced a decline of 25.73–55.98%, which means that the number of land contract disputes in some provinces still has some room to decline. In the horizontal comparison, the decline rate of the upstream (63.52%) was larger than that of the downstream (36.40%) and the middle stream (14.01%), and the proportion of the three was gradually balanced.

(3) The distribution of land contract disputes in the YEB is not random but has a significant (99% confidence) agglomeration feature. The fluctuation of the agglomeration
level of disputes has been strengthened. The HH agglomeration area moved from upstream to downstream and was still spreading, while the LL agglomeration area was relatively stable and began to spread to Chongqing and other places in 2021.

(4) The probability of a downward transfer of dispute grade is higher than that of an upward transfer, which shows that the frequent situation of land contract disputes in the YEB tends to improve. There is a “club convergence effect” in the transfer of land contract dispute grades, but this effect is weakened as the grades increase. After the introduction of spatial adjacency background, the “club convergence effect” of cities with lower dispute grades was enhanced, while the positive spillover effect is prominent. Therefore, the grade of land contract disputes in the YEB generally converges downward, but there is still a risk of “swing” in the transfer process.

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