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# The Time and Spatial Effects of A “City-County Merger” on Housing Prices—Evidence from Fuyang

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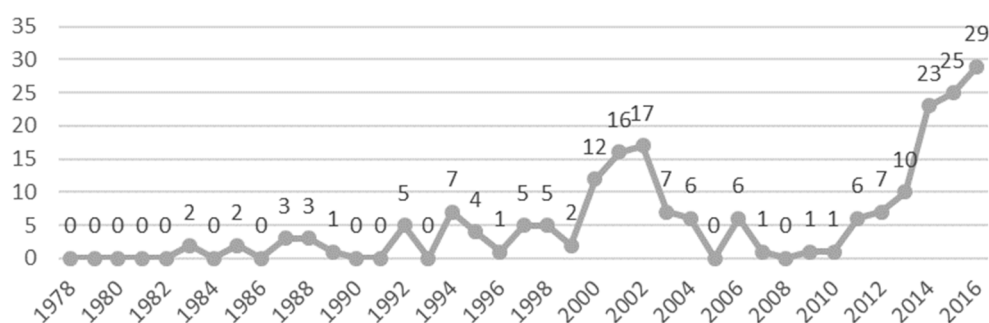


**Abstract:** Based on the price data of 19,211 second-hand houses based in the Fuyang District and West Lake District from the years of 2014, 2015, and 2019, along with the characteristic data of second-hand houses, this paper studies the influence of the city-county merger of Fuyang. Through a combination with the double differences model and the hedonic price model, it was found that the city-county merger had time and spatial effects on housing prices. With regard to time effect, the city-county merger hindered the growth of Fuyang’s housing prices in the short term, while it had a promoting effect on Fuyang’s housing prices in the long term. With regard to the spatial effect, it was found that in the long term, the effect of the city-county merger on the promotion of Fuyang’s housing prices increased first and then weakened with an increase in distance from the West Lake District. In addition, it had the strongest effect on the promotion of housing prices within 3–6 km of the West Lake District.

**Keywords:** city-county merger; house price; time effect; spatial effect

## 1. Introduction

The realization of economic and social integration development regionally is a common challenge for metropolitan governance globally. However, in contrast with mature countries that are inclined towards a more independent evolution of the economy and society, China is more accustomed to the compulsory integration by administrative means [1]. At present, China’s local administrative regions are divided into four levels: provinces (autonomous regions, centrally administered cities, special administrative regions), prefecture-level cities (prefectures), counties (county-level cities), and township [2]. In order to promote the process of urbanization and economic development, China has successively adopted various forms of administrative division adjustments (hereafter ADA) after the reform and opening-up, including the county-to-city upgrading, city-county merger, etc. [3]. However, China’s county-to-city upgrading policy has neither promoted economic growth nor achieved the expected goal of urban development [4]. Therefore, the county-to-city upgrading policy was suspended in 1997. Since 1999, local governments began to generally implement the city-county merger policy, especially after 2001, when China joined the World Trade Organization. In order to promote regional economic development and break the barriers of administrative regions, local governments have successively launched large-scale city-county mergers. Since 2011, in order to enhance the competitiveness of the central cities, promote the construction of new urbanization, and prevent the separation of counties (county-level cities) after the province-governing-county reform, city-county mergers have entered a new round of climax (Figure 1) [5].



**Figure 1.** Changes in the number of city-county mergers since the reform and opening-up. Source: According to the data of China administrative division network.

City-county mergers thus refer to the adjustment of counties or county-level cities into municipal districts of prefecture-level cities or municipalities directly under the central government. After the adjustment, an administrative integration between the original counties (or county-level city) and prefecture-level cities can take place, and the prefecture-level cities can then realize unified decision-making in urban planning, industrial layout, and infrastructure construction [6]. Meanwhile, a comparison with the original counties shows that the administrative power of the newly merged municipal districts is more restricted by prefecture-level cities, thereby leading to autonomy and enthusiasm of local development being reduced [7,8]. Indeed, although there have been a lot of practices in the city-county merger, the results have been different. Some areas get a new growth point in economic development after the city-county merger while other areas have a weak economic development after the adjustment. Besides, among the theoretical research, the analysis of the relationship between the city-county merger and economic development is still controversial. Some scholars pointed out that it has not brought about the improvement of development efficiency [9–16]. On the contrary, there are also a large number of scholars in the efficiency, fairness, economic development, and other aspects who proposed that there is a significant positive correlation between the city-county merger and urban economic development [17–20]. Furthermore, since the impact of the city-county merger on the economic growth of the merged county is uncertain, the impact on housing prices is also uncertain. We argue that the city-county merger is not only a time node but also a process. After the city-county merger, the economy, society, and administration need to be integrated. Logically, whether the integration process is smooth has a crucial impact on the economic growth and urbanization level of the new merged municipal district [1,21,22], and these will also be reflected in the variation of local house prices [23–30]. However, there is no time and spatial explanation for this uncertainty in the existing research. Besides, due to the limitation of the data, the existing research has yet to analyse the mechanism of the influence of the ADA on housing prices in the merged county. Moreover, the city-county merger is a heterogeneous process with various forms. The existing studies do not show the specific mechanism on the basis of individual cases, even though they revealed the logic of the impact on housing prices.

Since the reform and opening-up, China has continuously promoted the process of urbanization and made good achievements. In 2015, *The Blue Book of Cities: China's Urban Development Report No. 8* was released, which pointed out that during the "12th Five Year Plan" period, China's urbanization rate reached and began to exceed 50.0% for the first time, and reached 52.6% in 2012, exceeding the world's overall level (52.5%). By 2014, China's urbanization rate reached 54.8%. Hangzhou, the capital of Zhejiang Province, East China, has always been at the forefront of urbanization. In 2014, the urbanization rate of Hangzhou reached 75.0%. The further development of Hangzhou will inevitably be limited by the development space, and the city-county merger is just a way to facilitate the industrial expansion and the rational layout of urban production, life, and ecological space. In history, Hangzhou has taken the city-county merger policy for many times: Xiaoshan and Yuhang were formally merged into Hangzhou in 2001; Fuyang was officially merged in 2015.

Fuyang was once a county in Hangzhou since 1958. On 18 January 1994, with the approval of the State Council of the People's Republic of China, Fuyang county was abolished and Fuyang city was established with the same administrative area and subordinate relationship, which means that, from the perspective of administrative division, Fuyang is still a county-level city. On 13 December 2014, the State Council issued the official reply document and agreed. On 15 February 2015, the ceremony of the city-county merger was performed, officially declaring Fuyang to be a municipal district of Hangzhou. By 2019, Fuyang has been merged into Hangzhou for five years, which is beneficial not only for us to analyse the short-term changes in Fuyang but also to observe its long-term process.

Therefore, this paper selects Fuyang as the research object, analysing the time effect and spatial effect of the city-count merger on housing prices, and establishes the required measurement model based on the combination of the double difference model and the hedonic price model. Through the analysis, this paper points out that the city-county merger has a significant impact on housing prices. This impact varies with the distance to the city centre, and the basic logic and mechanism are clarified in the later section of the paper. This research can not only enrich the empirical research results of the impact of the city-county merger on housing prices in the merged districts but also provide valuable references for use in the future of public policy-making. We assume that if the city-county merger can promote economic development and maintain reasonable housing price fluctuations, it will be of great significance for regional sustainable development.

## 2. Literature Review

### 2.1. Administrative Divisions Adjustment and City-County Merger

Administrative division refers to the division of the national territory into several levels of administrative regions according to the needs of the political rule, public administration, and economic development. In addition, all levels of administrative regions will set up local government organs to implement public administration [31]. Generally, these administrative divisions will be adhered for a prolonged period. However, there have been cases where the need to meet the needs of national management, to better optimize regional allocation and urban spatial structure, or to coordinate the contradictions between or within the jurisdiction has led the existing administrative divisions to be adjusted. Indeed, these forms of ADA are not unique practices in China. Since the 1960s, developed countries such as Britain, Germany, and France have optimized urban management in the context of rapid urbanization through administrative division adjustment [32–34]. The United States also had similar city-county consolidation. At the end of the 19th century, the United States began to legislate that a merger has to pass a referendum, which guaranteed the democratic decision-making process of the city-county merger/consolidation from a legal level. Indeed, in most countries, the ADA stems more from the bottom up [7]. Only through being in-line with the needs of economic development and the demands of the people can the adjustment be passed. However, under the decentralization system utilised in China, the allocation of land, capital, and labour is superseded by local governments, and this results in the unique "administrative economy" with serious market segmentation between different administrative regions [35]. Therefore, this also makes it more meaningful to explore the impact of administrative division adjustment on economic development.

At present, China's local administrative regions are divided into four levels (Figure 2) [2]. To be specific, the provincial units can be divided into provinces, autonomous regions, and centrally administered cities. Among them, the prefecture level cities under general provinces can be divided into prefectures, prefecture-level cities, and autonomous zhou. Furthermore, there are three types of county-level units under prefecture level cities, which are counties, county-level cities, and districts. After the reform and opening-up, the main modes of adjustment of China range from the withdrawal of the prefecture in setting up a city, county-to-city upgrading, and the combination of prefecture and city to city-county merger [5]. Wu and Fu [31] pointed out that there are mainly two types of administrative division reform modes in China at present. These would be the city-county merger, which integrates

the original relatively independent counties (or county-level cities) into the prefecture-level cities, and the province-governing-county reform, which gradually decouples the counties and cities into decentralized and independent administrative subjects. The government policy-making department is of the view that the city-county merger can break the administrative division between the city and the neighbouring counties [7]: after the counties become municipal districts, the prefecture-level municipal governments can carry out a unified layout for urban planning and industrial layout, and this is conducive for market integration and the optimal allocation of resources.

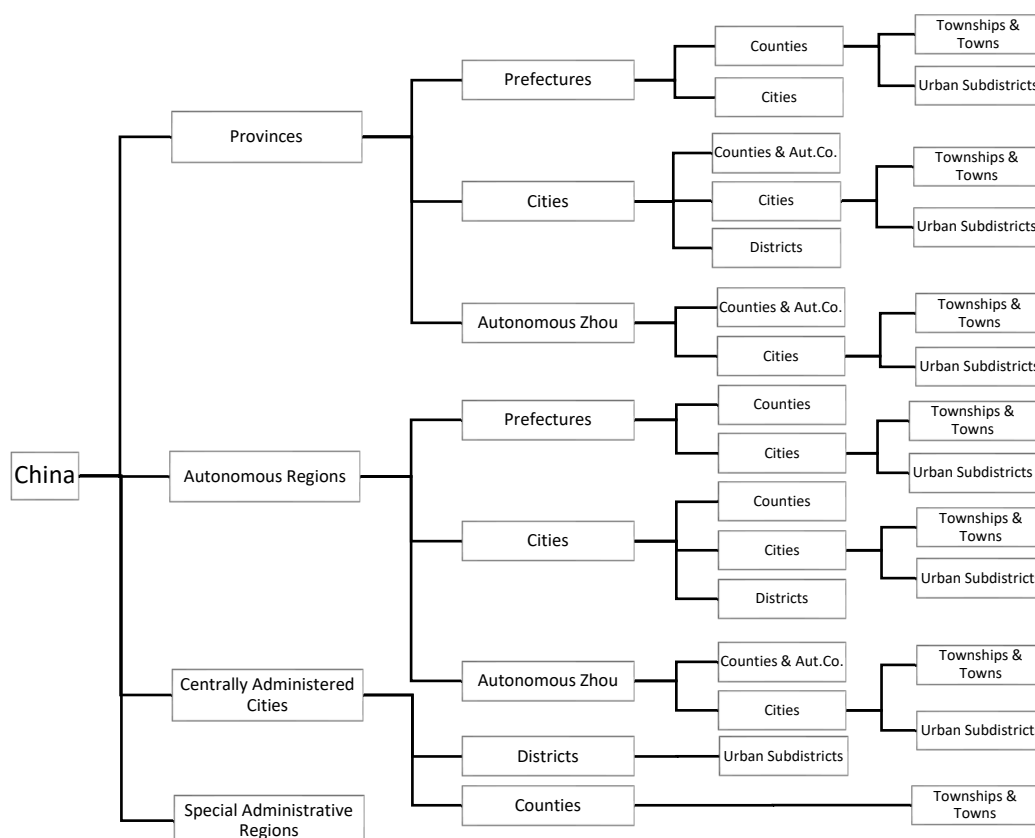


Figure 2. Administrative division of China. Source: Based on Ma [2].

The main purpose of cancelling a prefecture to set up a city is to withdraw the prefectures and establish prefecture-level cities or to merge the prefectures and prefecture-level cities. In this way, the connection between counties (county-level cities) in the region can be unified, which is beneficial for prefecture-level cities in playing the role of central cities and to coordinate and command the development. However, there are also problems, such as increasing management level, reducing management efficiency, intensifying competition between cities and counties, and the weak leading role of some cities [2,3]. County-to-city upgrading policy refers to the cancellation of the county system and the establishment of a county-level city with the same administrative status as the county in the original county administrative region. However, through the use of panel data of county-level cities, as shown by Fan and Zhang [4], China's county-to-city upgrading policy has neither promoted economic growth nor achieved the expected goal of urban development. Therefore, after the county-to-city upgrading policy was suspended in 1997, it was gradually replaced by other models.

Although the Ministry of Civil Affairs froze the examination and approval of the county-to-city upgrading, the local government adopted other adjustments so as to pursue scale efficiency and expand the city scale. Therefore, since 1999, local governments began to generally implement the city-county merger. City-county merger is the withdrawal of counties (county-level cities) originally subordinate to prefecture-level cities or municipalities directly under the central government, seeking

to establish municipal districts of the prefecture-level cities or municipalities directly under the central government in the original county's (county-level city) administrative areas [31]. In such a way, it provides a conducive environment to the central city in reducing coordination contradictions, integrating development resources, and expanding the development space of the city by means of administrative centralization. However, although some counties (county-level cities) do not meet the criteria of district transformation, local governments still choose to report them to the central government for approval for their own interests; on the other hand, some of the counties (county-level cities) do not enjoy the radiation benefits of prefecture level cities after being incorporated into the city [5].

Meanwhile, some scholars note that the reform of province-governing-county has been carried out since 2003 [31] in order to eliminate the financial difficulties of counties and townships under the system of "city-governing-county" and standardize the financial distribution relationship among provinces, cities, and counties (cities). The province-governing-county reform changed the relationship among provinces, cities, and counties from "province-city-county" three-level management of "city governing county" system to "province-city/county" two-level management, which made the county have a management authority similar to that of the city in terms of personnel, finance, planning, project approval, etc. This would allow the promotion of the free circulation of elements and give a full play to the role of the market, thereby promoting fair competition and advancing the development of county economy [36]. However, with the rapid development of the city, the spatial expansion of certain central cities was limited by the surrounding counties (county-level cities), and the coordination between adjacent administrative divisions became more difficult. In June 2009, the Ministry of Finance issued *The Opinions on Promoting the Financial Reform of Counties (County-Level Cities)*, which pointed out that by the end of 2012, China will comprehensively promote the financial reform of counties under the direct management of provinces. According to Wu and Liao [5], in consideration of their interests, prefecture-level cities once again actively applied to the central government, and the city-county merger started again in 2011.

## 2.2. The Impact of City-County Merger on Urban Economic Growth

In the existing research, the impact of city-county mergers on urban economic growth may be uncertain, and none of the relevant empirical researches has yet to come to any unanimous conclusions. According to Martin and Schiff [9], there is a lack of empirical evidence to show that city-county mergers improve efficiency, economic development, or equity. Rather, scholars argued that city-county consolidations do not improve efficiency [10–15]. Some scholars have found in investigations that the city-county merger has resulted in the problems of redundant construction and institutions, which directly leads to an increase rather than a decrease of financial expenditure [16,37–39]. In exploring the relationship between city-county merger and economic development, Feiock and Carr [14,15] investigated the number of three industrial sectors (manufacturing, retail, and services) through comparative intervention approaches. This was based on a follow-up survey of the merged Jacksonville-Duval County and the unmerged jurisdictions of Tampa and Hillsborough County. Through this analysis, it was found that there was no evidence that merge can promote economic development. Two years after the investigation, Carr, together with Sang-Seok and Wenjue [40] analysed the changes before and after the adjustment of Louisville and Jefferson counties in Kentucky on the basis of the original research and also concluded that there were no significant correlations between city-county consolidation and economic development. Furthermore, Stansel [41] used population growth and per capita income change to measure economic development but also found no positive correlation between consolidation and economic development.

Faced with the above queries regarding the fact that the impact of city-county mergers on urban economic growth may be insignificant, other scholars sustained that the city-county merger is conducive for efficiency, fairness, and economic development. Yu [1], Martin and Schiff [9], Boyne [18], Hudnout [19], Faulk, and Hicks [20] have pointed out from an economic perspective

that the amalgamation of city and county can reduce administrative duplication, which is conducive for the reduction of government financial expenditure and the realization of the economies of scale. Henderson [42] further argued that the merger directly brought about the growth of per capita income. Indeed, more scholars believed that in the process of urbanization, merger is conducive to breaking the administrative barriers between counties and cities, thereby promoting the flow of production factors and thus promoting regional economic development [3,43]. From a political perspective, the research of Savitch and Vogel [21] showed that the amalgamation of city and county can reduce the inequality brought about by suburbanization and create a future that includes economic growth and common prosperity for both urban and suburban residents. Ma [2] believed that merger effectively reduces competition, which is beneficial for the city as it will help it obtain greater economic and political power after the merger is accomplished. In addition, she proposed that the current layout of the Chinese government to obtain economic benefits from the adjustment of administrative divisions is effective for the regional economic development of developing or transition countries. Li and Xu [8] stressed that this kind of growth has a time effect: in the short term, it is conducive to growth, but in the long term, this disappears. They also added that the short-term growth of the investment is attributed to infrastructure construction, and the long-term impact is associated with the loss of economic growth incentives in the counties (county-level cities) that have been merged.

From an economic geography perspective, Boarnet and Haughwout [44] further pointed out that the amalgamation promotes the development of transportation and also brings about the migration of urban centre population, the shift of employment, and the overflow of land value. The city-county merger can also prominently improve the function of urban scale aggregation, the level of urban scale, and the function of an urban centre, all of which are conducive to the realization of regional coordinated development and the promotion of the urbanization rate. However, there are a scarce number of empirical studies on the adjustment of administrative divisions to housing prices. Fields [45] noted that the amalgamation of city and county promoted an increase in residency to low-density areas, but he did not extend his research to include relevant research and analysis of the impact on land and housing prices. Furthermore, Savitch et al. [17] proposed that the indicators of economic development should include income, profits, and property values in the analysis of ADA of Louisville. However, there are no specific analyses on the relationship between housing price and administrative division adjustment. Meanwhile, some scholars have used empirical research results to confirm that housing prices will be affected by the ADA. An instance of this is in the study by Shi and Xu [24], which found that the ADA will have a time and spatial effect on housing prices. In terms of time, the ADA can promote the rise of housing prices, and the increase in the previous stage is greater than that in the later stage; in terms of spatial effect, the growth potential of outer suburbs and suburbs is greater. Wang and Zhang [30] also proved through the synthetic control method that the city-county merger will promote the growth of housing prices in megacities and slow down the growth of housing prices in general in prefecture-level cities.

### *2.3. Influential Factors of House Prices*

From a macro perspective, urbanization and economic growth contribute to the rise of house prices [26,27,29,46–49]. Wang and Zhang [46] found that changes in urban household population, wage income, land supply, and construction costs were all primary factors that led to the rise of urban house prices; Glaeser et al. [47] pointed out that the increase in difficulty when obtaining regulatory approval for building new houses will also lead to the rise of house prices. Saiz [48] studied the impact of the geographical environment on house prices, and the research showed that most people thought that the areas in which the housing supply was inelastic were actually restricted by their geographical location, and the steep terrain inhibited the development of houses. As such, housing prices in areas where the land is limited are higher. Mankiw and Weil [49] studied the impact of demographic changes on the housing demand and found that era that saw the housing purchases of the "baby boom" generation (1946–1964) in the United States was a key factor in the rise of housing prices in the 1970s; Vogiazas

and Alexiou [26] showed that GDP, per capita GDP, and GDP growth rate had a remarkable positive impact on housing prices. Kishor and Marfatia [27] also found that an increase in income would lead to the rise in housing prices. Wang et al. [29] further noted that the increase of urbanization level would also lead to the rise in house prices. Drachal [50] studied the influencing factors of house prices in Poland. The results show that the rise of unemployment rate leads to the decline of house prices in all regions, but there are great elastic differences among regions. Égert and Mihaljek [51] analysed the influencing factors of house prices in eight transition economies in central and Eastern Europe and 19 OECD countries. It was found that GDP per capita, the development of housing credit, labour market, and the growth of real incomes can all play a positive role in the growth of house prices. Iacoviello [52] studied the macroeconomic factors of house price fluctuation in six European countries, and found that the adverse monetary impact has a negative impact on house prices, and the short-term monetary impact and demand impact are the important factors affecting house prices. To sum up, there is no doubt that if the city-county merge can affect the economic development and urbanization of the county, it will inadvertently also affect housing prices.

In the study of the urban interior, scholars mainly use the hedonic price model to study the factors of house prices [53,54]. Housing characteristics, neighbourhood characteristics, and location characteristics are the three main characteristic factors that affect house prices. Among them, architectural characteristics refer to the characteristics of the building itself; neighbourhood characteristics refer to the social, natural environment and economic level of neighbourhood, and supporting facilities of the residential area; location characteristics refer to the residential location that is related to the working and living convenience of the residents [55,56]. In the empirical study, Wen et al. [57] found that the building area, living facilities, parking space, and transportation lines all have a significantly positive impact on housing prices, while the housing age has a prominently negative impact on housing prices.

The degree of air pollution around the community [58–60] was also noted to have an impact on housing prices. Zheng and Kahn [60] confirmed that the high content of particulate matter in Beijing's air has a negative impact on housing prices. The existence of hazardous waste also reduces the price of housing [61]. Yue et al. [62] studied the pollution clean-up event of the Hangzhou pesticide plant in 2014 and found that the event devalued the price of housing within the surrounding radius of 3 km by 2.955%. The devaluation also continued after the pollution was eliminated. In contrast, open space, green space, park, lake, canal, wetland, and other pleasant landscape facilities lead to the rise of housing prices [63–65]. Mahan et al. [63] found that there is a significant positive correlation between house price and wetland area, but there is a negative correlation between house price and wetland distance. Wen [64] showed that West Lake in Hangzhou had a significant positive impact on house prices. The impact was as follows: As the distance to West Lake increased by 1%, the housing prices decreased by 0.159%.

If the crime rate in the surrounding area increases, the house price decreases [66,67]. If good quality of primary and secondary education exists in the vicinity, it can bring about an increase in house prices [68,69]. However, Sah et al. [70] found that traffic congestion, parking, and light pollution caused by schools have a negative impact on the nearby house prices after controlling for spatial autocorrelation problems. In order to better solve the endogenous problem, Collins and Kaplan [71] used Memphis city school and Shelby country school's consolidation as a natural experiment to re-estimate the impact of changes in education quality on housing prices. Through this, they found that the improvement of education quality had a significantly positive impact on housing prices.

Infrastructure such as rail transit can also improve the convenience of transportation and thus promote the rise of house prices [72–75]. Bajic [72] studied the impact of Toronto metro lines on prices and found that increased accessibility and reduced commuter costs were capitalized as part of the house price. This led to the rise in house prices. Billings [73] took the light rail transit in Charlotte City of the United States as the research object, and the study showed that there was a premium of 11.3% for apartments within 1 km from the rail station and a premium of 4.0% for single families.

Wen et al. [74] studied the impact of new metro lines in Hangzhou on housing prices, and the empirical results showed that the Metro significantly increased the surrounding housing prices. The average housing prices within the station radius of 2 km were found to be 2.1% to 6.1% higher than those outside the range.

#### 2.4. Literature Evaluation

Scholars have produced rich and useful works in the field of administrative division adjustment and housing price research. Nevertheless, a scarce number of scholars have analysed the impact of administrative division adjustment, especially that affecting county (city) reform, on housing prices. Since the adjustment of administrative divisions can affect local economic development, they also affect house prices. The existing research also shows that the construction of the subway and other infrastructure brings about changes in house prices. The merger of administrative divisions may also affect the change of house prices through the building of a subway to better connect districts and counties. As housing prices can be viewed to either be an important part of denoting the wealth of residents or an important influencing factor related to whether the housing demand of residents can be effectively met, it is of great practical significance to investigate the impact the adjustment of administrative divisions has on housing prices. However, unlike previous studies on the performance of administrative division adjustment, this paper considers that the administrative division adjustment of city-county merger is a process of regional integration, so it is necessary to not only pay attention to the short-term effect of county construction but also include the long-term effect and spatial effect.

### 3. Research Design

#### 3.1. Hypothesis Proposal

Existing studies have shown that the impact of city-county merger on economic growth and urbanization of the merged area is uncertain [7,8], and the economic level and urbanization level of the city has a positive role in promoting housing prices [3,27–31,36]. It can also be seen that after the city-county merger, it is difficult to predict how housing prices in the merged areas will be affected. Although the city-county merger of Fuyang was recognized and supported by the Fuyang and Hangzhou governments, it is still impossible to reach a final conclusion on its impact on Fuyang's development in the early stage of the merger. Therefore, it is proposed that:

**Hypothesis 1.** *In the early stages, the city-county merger of Fuyang and Hangzhou had no definite effect on housing prices in Fuyang.*

If the merger of Fuyang had an impact on Fuyang's housing prices, there would be time and spatial differences in this effect. In terms of time, it would take time for the city-county merger to effectively play a positive role. In 2000 and 2001, "Xiaoshan City", which had yet to be merged, was ranked respectively No. 9 and No. 7 in the top 100 counties (cities), and ranked No. 1 in the cities of Zhejiang Province. In the previous two years, Xiaoshan District was ranked No.5 in China but ranked No.2 within the province (the first was Yinzhou District of Ningbo), which reflected that Xiaoshan's development after the merger was not as good as expected. Figure 3 shows the GDP changes of parts of Hangzhou city from 1998 to 2011 (the "urban area" includes the West Lake District, Shangcheng District, Xiacheng District, Binjiang District, Jianggan District and Gongshu District, and the data of 2004 is missing). It can also be seen that the GDP growth rate of Xiaoshan and Yuhang in the early stage of the merger was slower than that of Hangzhou City urban area in 2001. Hence, it has been demonstrated that in the early stages of a merger, the merger could not play a positive role in promoting economic growth. In the long run, however, Xiaoshan's economic growth has been relatively flat, while Yuhang's economic growth momentum became relatively strong. In 2017, the GDP exceeded Xiaoshan, which also reflects the uncertainty of the economic impact of the city-county



merger. Only when the relationship between cities and districts is adjusted and social integration is in place can the economy be developed

In order to promote the integration of Fuyang, the Hangzhou municipal government and the Fuyang district government have taken a series of actions, which will be explained in detail later. However, it will take time for Fuyang to fully integrate into Hangzhou. In the early stages of the merger, Fuyang had no essential changes. A few years later, Fuyang's policies gradually improved, and infrastructure such as transportation, medical care, and education was completed, aspects that were conducive to the development of Fuyang. At the same time, urban development had an obvious role in promoting housing prices. Therefore, with the gradual deepening of the integration of Fuyang and Hangzhou, the authors predict that Fuyang's house prices will significantly improve at an increasing rate. As such, it can be proposed that:

**Hypothesis 2.** *The city-county merger of Fuyang and Hangzhou has a time effect on housing prices in Fuyang. With the gradual deepening of the integration of Fuyang and Hangzhou, the house prices of Fuyang will rise more significantly.*

Hangzhou has also invested a substantial amount into the integration of Fuyang, such as the "Hangzhou Fuyang Intercity Railway" project, which was planned and financed by the Hangzhou government. This was how they aimed to strengthen the connection between the two regions. On the other hand, the development space of Hangzhou urban area is limited. The merger of Fuyang, which is adjacent to the West Lake District, provides space for industrial expansion. Since the traffic between the area closer to Hangzhou and the urban area is more convenient, the expanded industries are more likely to enter these areas, and thus, the economy and housing prices in this area are more vulnerable. Therefore, in Fuyang District, it can be seen that the closer houses are to the Hangzhou urban area, the greater the impact of housing prices. It is proposed that:

**Hypothesis 3.** *The city-county merger of Fuyang and Hangzhou has a spatial effect on housing prices in Fuyang. The closer Fuyang houses are to the centre of Hangzhou, the greater the impact on house prices.*

### 3.2. Variable Description and Data Source

#### 3.2.1. Dependent Variable

This study takes the house price as the dependent variable, which is set as P. The second-hand housing transaction price data of West Lake District and Fuyang District, Hangzhou, from before and after the day of the merger were used for measurement. Since the formal city-county merger of Fuyang took place on 15 February 2015, this paper collects the house price data before and after that date. The house price data from 2014–2015 are derived from the housing transaction information of a real estate intermediary company. As the second-hand house transaction prices from the beginning of 2019 cannot be obtained, the listing price of the purchase website is used instead. However, due to the unified use of the listing price to measure the sample house price in 2019, there is a deviation between the listing price and the real transaction price, which led to a systematic error. But this has little impact on the final result. There will be deviation between the listing data and the real transaction price, but whether it is on the high side or on the low side, the deviation on the same sales website is systematic, which will have the same impact on Fuyang District and West Lake District, so it will not have an impact on the natural experimental estimation results of this study. What is more, scholars used listing price data for research, providing a basis for this paper [76].

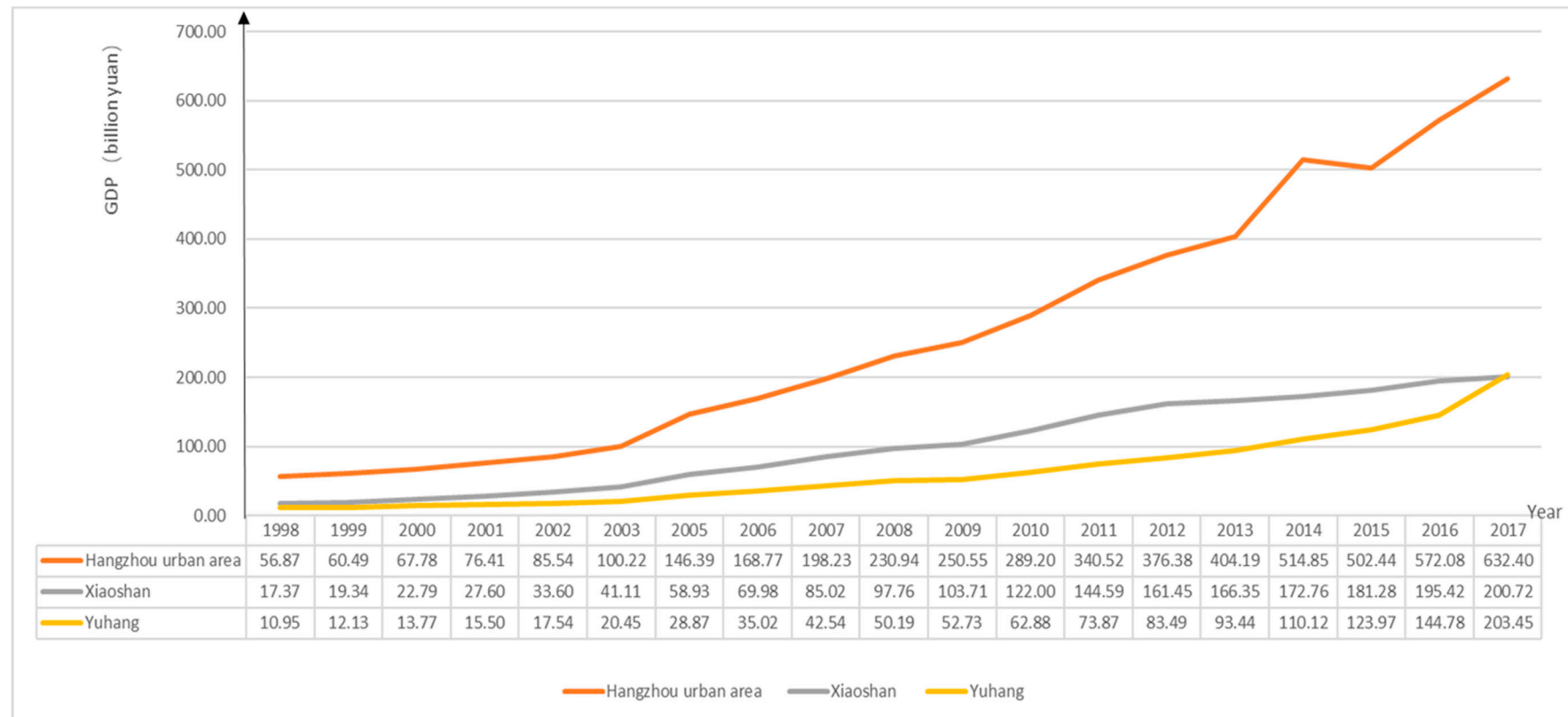


Figure 3. The GDP growth of parts of Hangzhou City from 1998–2011 (unit: billion yuan). Data source: Hangzhou Statistics Yearbook.

For the purpose of macro-control, many cities in China have taken long-term price limit measures for new houses, as has Hangzhou. In 2011, Hangzhou Municipal Price Bureau issued *The Notice on the Application and Filing Management of the Sales Price of Commercial Housing in the Urban Area*, which implements the application and filing management of the sales price of commercial housing in the urban area of Hangzhou. When applying for the pre-sale license of new commercial housing, it is necessary to declare the price and provide the pricing basis, implement the one price of one house requirement, and clearly mark the price at the time of sale. When improving the sale price of housing, the price needs to be municipally approved so as to establish a normal price order and market norms and control the price increase. In *The "13th Five Year" Performance Management Plan of Hangzhou Price Bureau* released in 2017, the declaration and filing of commodity housing sales price was clearly included in the "main functional performance indicators", and it was proposed that "our bureau, together with relevant departments, earnestly implement the registration management of urban commodity housing sales price to ensure that the registration rate of market commodity housing price declaration is 100%; the project with pre-sale license in Hangzhou price network should have a publicity rate of 100%". Thus, Hangzhou attaches great importance to the price control of new houses. The Hangzhou municipal government has also directly and repeatedly proposed the "new house price limit" initiative: in 2011, the general office of Hangzhou municipal government issued *The Implementation Opinions on Further Improving the Regulation and Control of the Real Estate Market*, which mentioned that "according to the city's economic development goals, the growth rate of per capita disposable income and the residents' ability to pay for the purchase of houses, our city will comprehensively study and determine the annual new house price control". In 2013, the general office of Hangzhou municipal government issued a notice on continuing to do a good job in the regulation and control of the real estate market, which clearly stated that the price increase of new commercial housing in 2013 was lower than the actual increase of per capita disposable income of urban households in this city. Affected by the above measures, the new house prices cannot reflect the real price information, so it is more appropriate to study the second-hand house prices without price limit intervention. In addition, scholars also used the second-hand housing transaction price data for research, which provides a basis for this paper to use the second-hand housing data [66,71].

### 3.2.2. Independent Variable

The independent variable of this study is to see whether it is ideal to implement a city-county merger, and dummy variables are used as the measurement standard. The staged virtual variable T is used to measure the before and after implementation of the merger. If it is implemented, then the value is 1, otherwise it is 0. The grouped virtual variable a is used to measure the implementation of the merger. If it is the implementation area, then the value is 1, otherwise it is 0.

### 3.2.3. Control Variables

In order to improve the accuracy of the empirical analysis results, a series of control variables were added in this study. Table 1 holds a specific description of each variable.

**Table 1.** Control variables and description.

Housing Characteristics	Variable Name	Variables Description	Data Sources
Architectural characteristics	M <sub>1</sub>	House space	Housing transaction information
Location characteristics	M <sub>2</sub>	Distance to the nearest bus stop	ArcGISmeasure
	M <sub>3</sub>	Distance to the West Lake	
	M <sub>4</sub>	Distance to Qianjiang New CBD	
	M <sub>5</sub>	Distance to Qiantang River	
Neighbourhood characteristics	M <sub>6</sub>	Is there a subway nearby	Electronic map
	M <sub>7</sub>	Is there a school nearby	
	M <sub>8</sub>	Is there a third-grade hospital nearby	
	M <sub>9</sub>	Is there a shopping centre nearby	
	M <sub>10</sub>	Is there a bank nearby	

### 3.3. Establishing the Econometrics Model

Hangzhou is the capital of Zhejiang Province, located in the north of Zhejiang, south-eastern coastal area of China (Figure 4). Fuyang is part of Hangzhou, located in the southwest of Hangzhou City and bordered by Yuhang District, Xiaoshan District, and West Lake District. Figure 5 shows the specific location of Fuyang.

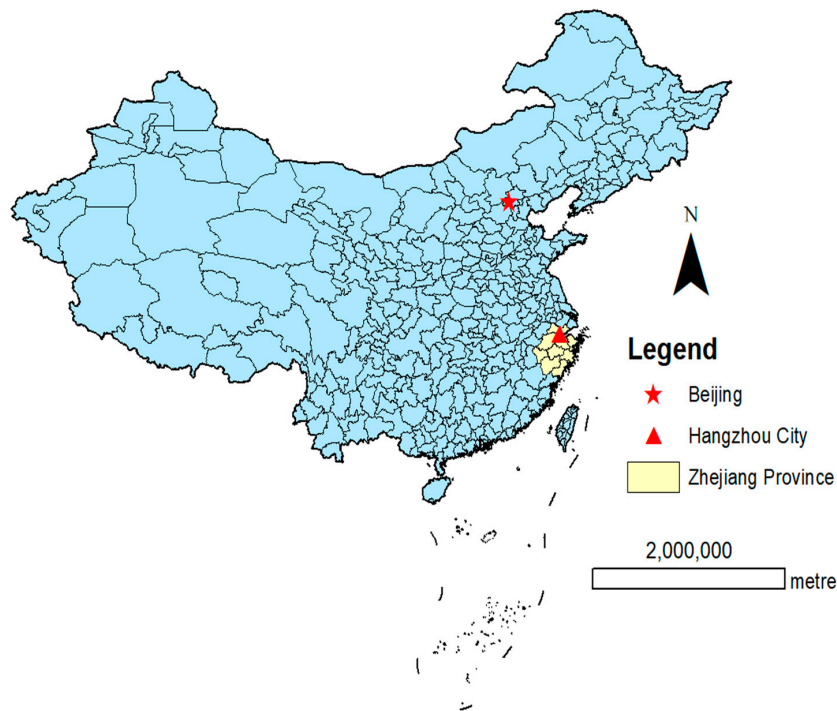


Figure 4. Location map of Hangzhou.

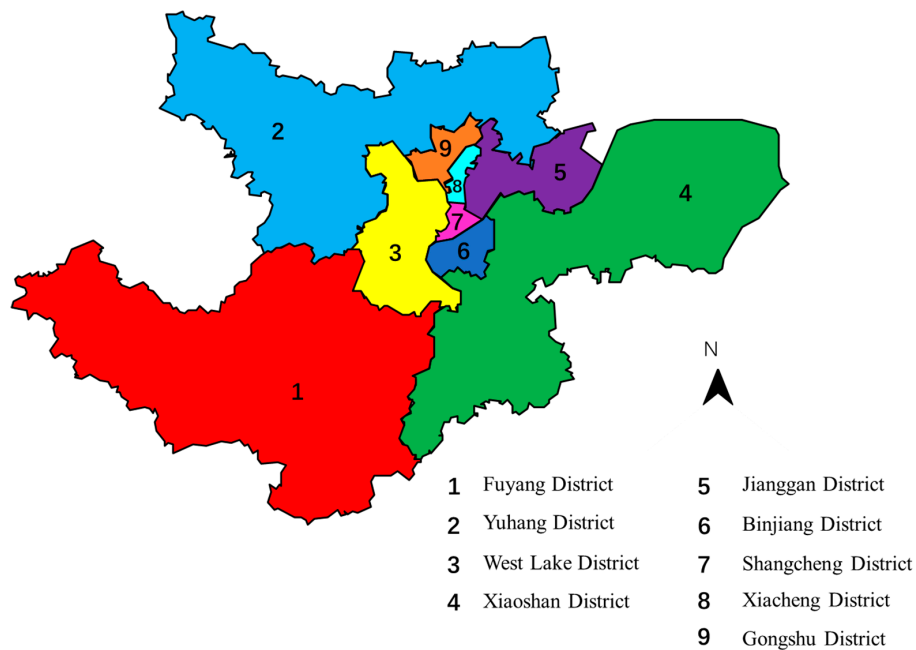


Figure 5. Location of Fuyang District. Notes: Hangzhou City consisted of 2–9 in 2014.

Before 2014, Fuyang was an independent county-level city; by 15 February 2015, Fuyang was officially listed as a district of Hangzhou. In 2014, Hangzhou became a metropolis with a population

of more than 6 million, with a per capita GDP of 115.43 thousand yuan per person. Before the merger, Fuyang's economic development level had been in the top 30 of China's top 100 counties for a long time. It can be seen from Table 2 that in 2014, the population of Fuyang City was less than one million, and the per capita GDP was 82.38 thousand yuan per person, but there was a certain gap compared with West Lake District and Hangzhou.

**Table 2.** Development of Fuyang, West Lake, and Hangzhou in 2014.

	Fuyang City	West Lake District	Hangzhou City
Population (million)	0.73	0.84	6.39
Employment (million)	0.25	0.64	3.84
GDP (billion yuan)	60.14	80.2	737.59
GDP per capita (1000 yuan/person)	82.38	95.48	115.43
Area of jurisdiction (km <sup>2</sup> )	1808	263	2068

Data source: 2014 Hangzhou Statistical Yearbook. Notes: Fuyang was a county-level city in 2014. Hangzhou City consisted of West Lake District, Yuhang District, Xiaoshan District, Jianggan District, Binjiang District, Shangcheng District, Xiacheng District, and Gongshu District in 2014.

In this paper, the double difference model is used to investigate the impact of Fuyang's city-county merger on housing prices. In addition to the areas where the policy was implemented, the areas where the policy was not implemented should also be selected for comparison. Because in the three areas bordering Fuyang, the housing price data of Yuhang District and Xiaoshan district cannot be obtained, this paper chooses West Lake District as the control group, and West Lake District and Binjiang District as the control group of robustness test.

In this study, we want to test the time effect and special effect of the merger on Fuyang housing prices, so we divide the study into two stages, both of which use the double difference model combined with the hedonic price model. In this paper, the specific idea of establishing the double difference model is to set up the experimental group and the control group and introduce the characteristic price variable as the control variable, so as to compare the differences between the experimental group and the control group under different conditions and analyse the policy effect.

In the first stage, Fuyang District, which had been merged, was taken as the experimental group and West Lake District, which had never been merged, as the control group. In the follow-up empirical analysis stage, we used 2014 and 2015 samples to analyse the short-term impact, and 2014 and 2019 samples to analyse the long-term effect. The measurement model is as follows:

$$\ln(P_i) = \beta_0 + \beta_1 T_i + \beta_2 A_i + \beta_3 (T_i \times A_i) + \sum_{n=1}^{10} \gamma_n M_{ni} + e_i \quad (1)$$

where  $n$  value is 1–10;  $\beta_0$  is a constant;  $\beta_1$ ,  $\beta_2$ , and  $\beta_3$  are estimated coefficients;  $\gamma_n$  represents the characteristic price of each control variable; and  $e_i$  stands for residual. Table 3 shows the specific meaning of each variable.

**Table 3.** Variables and description.

Variable	Variable Description
$P_i$	The explained variable that represents the transaction price of second-hand house $i$ .
$T_i$	A staged dummy variable, reflecting the time effect of the policy. It is taken as 1 after the merger (15 February 2015), otherwise, it is 0.
$A_i$	A grouped dummy variable reflecting whether the city in which the second-hand house $i$ is located is to be merged. If it is implemented, the value is 1, otherwise, it is 0.
$T_i \times A_i$	The interaction term between $A_i$ and $T_i$ , which is used to measure the impact of the city-county merge on urban housing prices.
$M_{ni}$	Control variables.

In the second stage, in order to further study the spatial effect of the merger on housing prices, the next step would be to group the second-hand housing samples in Fuyang district, according to the distance from the Fuyang district to the West Lake District, with the unit length of the group being 3 km, taking the nearest group as the benchmark group and then comparing and analysing the regression results of other groups against the benchmark group. The distance from the second-hand house to the West Lake District is measured by the distance from the second-hand house to the common administrative boundary between Fuyang district and West Lake District, which is measured by ArcGIS. Therefore, this paper constructed the following measurement model and Table 4 shows the specific meaning of each variable:

$$\ln(P_i) = \beta_0 + \beta_1 T_i + \beta_2 D_i + \beta_3 (T_i \times D_i) + \sum_{n=1}^{10} \gamma_n M_{ni} + e_i \quad (2)$$

**Table 4.** Variables and description.

Variable	Variable Description
$P_i$	The explained variable that represents the transaction price of second-hand house $i$ .
$T_i$	A staged dummy variable, reflecting the time effect of the policy. It is taken as 1 after the merger (15 February 2015), otherwise, it is 0.
$D_i$	A grouped dummy variable reflecting whether the second-hand house is located in the benchmark group. The value in the benchmark group is 0, otherwise, it is 1.
$T_i \times D_i$	The interaction term between $D_i$ and $T_i$ , which is used to measure the spatial effect of the merger of Fuyang City on Fuyang house prices.
$M_{ni}$	Control variables.

Note: The meanings of other symbols are the same as those found in the formula (1).

#### 4. An Empirical Test on the Influence of the City-County Merger of Fuyang City to Housing Prices

##### 4.1. Descriptive Statistics

Figure 6 shows the spatial distribution of the second-hand housing samples in this study. In China, urban commercial housing is mainly concentrated in the centre of the city. The southwest of the West Lake District is mainly a scenic area, with few commercial residential areas. Within the sample period, there was no second-hand commercial housing transaction in the southwest of the West Lake District, so it was not included in the samples. In order to understand the overall situation of all the sample data, descriptive statistics are carried out for the main variables prior to the empirical test.

Table 5 shows that the price levels in the Fuyang district are far lower than those of the West Lake District. Within a year of the merger, the price of second-hand houses in the two districts was not found to have changed significantly. However, after four years, the price of second-hand houses in the two districts increased prominently and the infrastructure after the merger became more developed. In addition, it was seen both before and after the merger that the infrastructure of the West Lake district was more complete than that of Fuyang District, and the transportation and travel to the prosperous areas of West Lake district were more convenient than those of the Fuyang district.

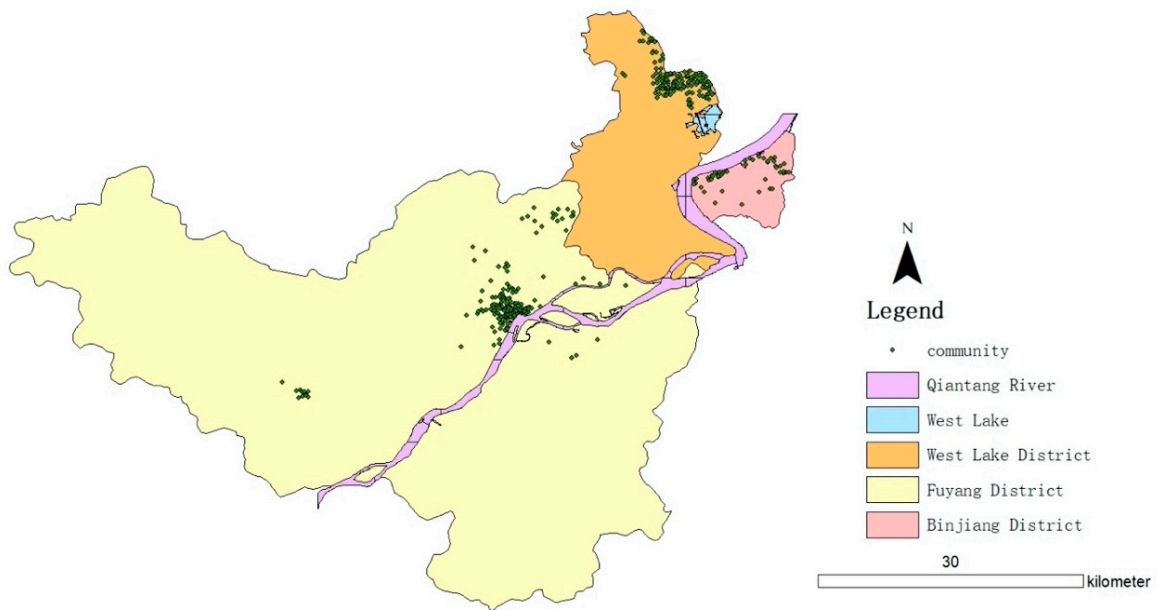


Figure 6. Spatial distribution map of the second-hand house sample community.

Table 5. Descriptive statistics.

Variable	Before Merger (2014.1–2015.2.14)		After Merger (2015.2.15–2015.12)		After Merger (2019.3)	
	Fuyang District	West Lake District	Fuyang District	West Lake District	Fuyang District	West Lake District
Observations	2057	3672	3164	4941	2519	2858
Contract price (yuan/m <sup>2</sup> )	7764 (2602)	22829 (6696)	7194 (3293)	22973 (7046)	22410 (7615)	48359 (13552)
Area (m <sup>2</sup> )	143.0 (91.48)	86.83 (35.32)	133.5 (662.13)	90.23 (36.46)	201.0 (95.76)	90.47 (36.22)
Subway	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0.419)
School	0.701 (0.458)	1 (0)	0.842 (0.365)	1 (0)	0.475 (0.499)	1 (0)
3rd grade hospital	0 (0)	0.541 (0.498)	0 (0)	0.540 (0.498)	0 (0)	0.556 (0.497)
Shopping mall	0.357 (0.479)	0.526 (0.499)	0.357 (0.479)	0.518 (0.500)	0.146 (0.353)	0.522 (0.500)
Bank	0.850 (0.357)	1 (0)	0.917 (0.277)	1 (0)	0.624 (0.484)	1 (0)
Distance to the nearest bus station (m)	269.5 (183.5)	184.8 (64.91)	211.9 (164.9)	190.3 (65.97)	351.4 (186.9)	177.2 (65.31)
Distance to the West Lake (km)	21.94 (6.171)	4.592 (2.379)	23.86 (6.447)	4.657 (2.340)	17.91 (4.318)	4.408 (2.216)
Distance to Qianjiang New CBD (km)	29.70 (5.588)	11.03 (2.383)	31.63 (6.198)	11.13 (2.407)	26.27 (4.045)	10.94 (2.284)
Distance to the Qiantang River (km)	3.782 (3.289)	10.24 (2.380)	3.000 (3.190)	10.28 (2.312)	6.777 (3.085)	10.04 (2.195)
Distance to the administrative boundary (km)	6.971 (4.880)	15.48 (1.462)	8.680 (5.672)	15.42 (1.485)	4.463 (3.354)	15.28 (1.423)

Notes: The data in Table 5 are the mean value, and the data in () are the standard deviation.

#### 4.2. The Suitability Test of a Double Differences Model

A Parallel trend hypothesis is an important premise of the double differences model. Hence, before empirical regression, parallel trend tests are needed to verify whether the changing trends of the experimental group and the control group are consistent before the implementation of the policy. As such, the following model was established:

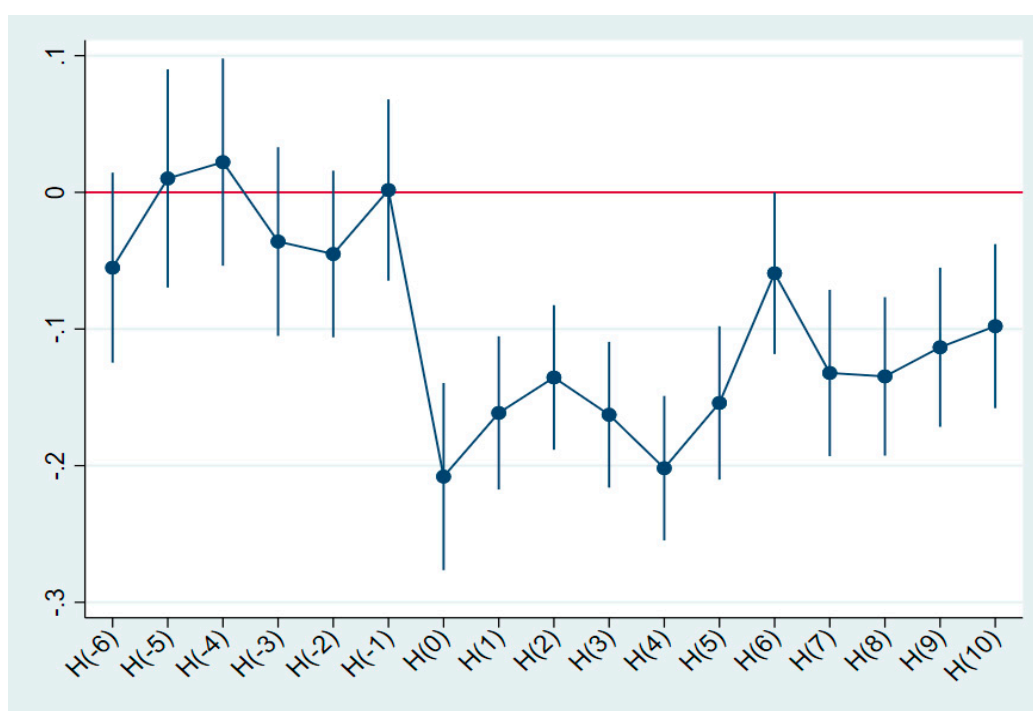
$$Ln(P_{it}) = \alpha_0 + \alpha_1 \sum_{k \geq 10} H_{it_0+k} + \sum_{n=1}^{10} \gamma_n M_{ni} + e_i \quad (3)$$

where  $\alpha_0$  is a constant;  $\alpha_1$  refers the effect of the merger in that month;  $\gamma_n$  represents the characteristic price of each control variable; and  $e_i$  stands for residual. The inspection results are shown in Figure 3, where  $H(0)$  refers to the month of implementation of the policy. The specific meanings of variables were listed on Table 6.

**Table 6.** Variables and description.

Variable	Variable Description
$P_i$	The explained variable that represents the transaction price of second-hand house $i$ .
$H$	A dummy variable. If the city-county merger is implemented in $t_{0+k}$ month, the value is 1, otherwise, it is 0.
$M_{ni}$	Control variables.
$t_{0+k}$	$t_0$ is the month of implementation of the policy. $-10 \leq k \leq 10$ , when $k < 0$ , it refers that $t_{0+k}$ is the $k$ -month before the merger; when $k \geq 0$ , it refers that $t_{0+k}$ is the $k$ -month after the merge.

Figure 7 shows that the estimated coefficient of 6 months before the implementation of the city-county merger is not significant. The result indicates that in the 6 months before the merger, the changing trend of house prices in the Fuyang and West Lake District is basically the same, thus passing the parallel trend test.



**Figure 7.** Parallel trend test results. Notes: The points represent the fitting mean, and the vertical line represents the 95% confidence interval. When the horizontal line with the value of "0" falls within the confidence interval, there is no statistical difference between the estimated coefficient and 0.

#### 4.3. Difference-In-Differences Regression and Result Analysis

After testing the applicability, the next step is the empirical analysis. The empirical study is divided into two parts; the first part studies the time effect of Fuyang's city-county merger, and the second part studies the spatial effect of Fuyang's city-county merger.



#### 4.3.1. The Time Effect of Fuyang's City-County Merger on House Prices

In this part, the sample data from both before and after merging was put into the formula (1), and the regression results of Tables 3 and 4 were procured. Among them, Table 3 estimates the short-term impact of the city-county merger on house prices and uses the samples from 2014 and 2015; Table 4 estimates the long-term impact of the city-county merger on house prices. The samples used before the merger remain unchanged, and the samples after the merger (February 2015) are replaced by samples from 2019. The control groups in columns (1) and (2) of the two tables are the samples from the West Lake District, while the samples from the riverside area are added in columns (3) to (6) for the robustness test.

Table 7 shows the short-term effect of the city-county merger of Fuyang on house prices. Column (1) shows that the interaction term  $T \times A$  had a significantly negative impact on house prices, and the regression coefficient is  $-0.129$ , which indicates that the price of Fuyang decreased by about 12.9% when compared with that of West Lake District in a short period of time due to the city-county merger. Column (2) shows that the interaction term  $T \times A$  still had a significant negative impact on house prices after the control variables were added, and the regression coefficient is  $-0.0961$ . This indicates that the city-county merger had a significantly negative impact on house prices of Fuyang Compared with the West Lake District over a short period of time, and it decreased by 9.61%. This also shows that the city-county merger hindered the growth of Fuyang house prices in the short term. The results of columns (3) to (6) are thus consistent with the first two columns, indicating that they are robust.

**Table 7.** Regression results of the short-term impact of the city-county merger of Fuyang on housing prices.

	(1)	(2)	(3)	(4)	(5)	(6)
Explanatory variable Control sample area	Ln (P) West Lake District	Ln (P) West Lake District	Ln (P) Binjiang District	Ln (P) Binjiang District	Ln (P) West Lake+ Binjiang	Ln (P) West Lake+ Binjiang
$T \times A$	$-0.129^{***}$ (0.0143)	$-0.0961^{***}$ (0.0131)	$-0.177^{***}$ (0.0166)	$-0.146^{***}$ (0.0162)	$-0.135^{***}$ (0.0125)	$-0.103^{***}$ (0.0118)
Before and after the merger (T)	0.00377 (0.00871)	0.00526 (0.00791)	0.0518 <sup>***</sup> (0.0120)	0.0525 <sup>***</sup> (0.0115)	0.00968 (0.00659)	0.0174 <sup>***</sup> (0.00611)
Merged district (A)	$-1.111^{***}$ (0.0110)	$-0.979^{***}$ (0.0295)	$-0.822^{***}$ (0.0130)	$-0.364^{***}$ (0.0311)	$-1.013^{***}$ (0.00972)	$-0.406^{***}$ (0.0228)
Constant	9.994 <sup>***</sup> (0.00660)	10.55 <sup>***</sup> (0.0343)	9.704 <sup>***</sup> (0.00942)	9.571 <sup>***</sup> (0.0288)	9.896 <sup>***</sup> (0.00506)	9.613 <sup>***</sup> (0.0227)
Control Variables	×	√	×	√	×	√
Observations	13,834	13,834	10,128	10,128	18,741	18,741
R-squared	0.676	0.734	0.567	0.601	0.631	0.683

Standard errors in parentheses; \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

Table 8 shows the long-term effect of the city-county merger of Fuyang on housing prices. Column (1) shows that the interaction term  $T \times A$  has a very significant positive impact on house prices and had a regression coefficient of 0.331. This indicates that housing prices in Fuyang had increased by about 33.1% as compared to the West Lake District within 4 years after the city was removed. Column (2) showed that the interaction term  $T \times A$  also had a significant positive impact on house prices and had a regression coefficient of 0.338. This indicates that the city-county merge made the price of Fuyang relatively higher than that of West Lake District within the first 4 years. The area also increased by about 33.8%. This shows that the city-county merger of Fuyang can promote the growth of Fuyang housing prices in the long term. The results of columns (3) to (6) are consistent with the first two columns, and this indicates that they are robust.

**Table 8.** Regression results of the long-term impact of the city-county merger of Fuyang on housing prices.

	(1)	(2)	(3)	(4)	(5)	(6)
Explanatory variable	Ln (P) West Lake District	Ln (P) West Lake District	Ln (P) Binjiang District	Ln (P) Binjiang District	Ln (P) West Lake+ Binjiang	Ln (P) West Lake+ Binjiang
$T \times A$	0.331 *** (0.0129)	0.338 *** (0.0157)	0.319 *** (0.0148)	0.263 *** (0.0152)	0.335 *** (0.0120)	0.235 *** (0.0131)
Before and after the merger (T)	0.755 *** (0.00828)	0.724 *** (0.0123)	0.767 *** (0.00871)	0.780 *** (0.0113)	0.751 *** (0.00669)	0.719 *** (0.00831)
Merged district (A)	-1.111 *** (0.00914)	-1.007 *** (0.0250)	-0.822 *** (0.0113)	-0.374 *** (0.0306)	-1.013 *** (0.00862)	-0.540 *** (0.0221)
Constant	9.994 *** (0.00548)	10.61 *** (0.0273)	9.704 *** (0.00775)	9.566 *** (0.0212)	9.896 *** (0.00449)	9.689 *** (0.0180)
Control Variables	×	√	×	√	×	√
Observations	11,106	11,106	8108	8108	14,638	14,638
R-squared	0.773	0.835	0.735	0.784	0.735	0.781

Standard errors in parentheses; \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

In order to find the difference between the  $T \times A$  regression coefficient in 2015 and  $T \times A$  regression coefficient in 2019, a Chow test was carried out for  $T \times A$  coefficients in the corresponding columns of Tables 3 and 4, respectively, and the test results are as follows (Table 9):

**Table 9.** The results of Chow test.

	(1)	(2)	(3)	(4)	(5)	(6)
chi2(1) =	1161.31	701.86	1183.44	672.18	1296.38	487.54
Prob > chi2 =	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

In Table 9, columns (1), (3), and (5) show that when no control variables are added, the  $T \times A$  coefficient in 2015 is significantly different from that in 2019 in statistical sense; columns (2), (4), and (6) show that after adding control variables, the  $T \times A$  coefficient in 2015 is still significantly different from that in 2019. It can be seen that there are significant differences in the impact of Fuyang's housing prices one year after the merger and four years after the merger. Accordingly, the city-county merger of Fuyang has a time effect on Fuyang house prices. It hinders the growth of Fuyang house prices in the short term and promotes the growth of Fuyang house prices in the long term.

#### 4.3.2. The Spatial Effect of the City-County Merger of Fuyang on House Prices

In this part, the paper explores the spatial effect of the city-county merger of Fuyang on Fuyang housing prices. To do this, the second-hand housing samples of Fuyang are grouped according to the distance from the second-hand housing to the West Lake District. Since the distance from the sample to the West Lake area ranges from 0.015 km to 31.4 km, and the number of samples with a distance greater than 12 km is very small, this paper divides the sample into four groups with a unit length of 3 km and takes the nearest group (0–3 km) from the West Lake area as the reference group. The other groups are then compared with the reference group respectively. Due to the short-term merger that has yet to fulfil its role fully, this paper looks to study the long-term spatial effect. Substituting the sample data of 2019 before and after the merger into formula (2), the following results were obtained.

Table 10 shows the spatial effect on the house prices of Fuyang four years after the merger of Fuyang. Column (1) shows that the coefficient of interaction term  $T \times D$  is 0.0624, which is significantly positive at the statistical level of 0.05, indicating that the housing prices within the range of 3–6 km away from the West Lake District increased by about 6.24% as compared to the benchmark group. Column (2) shows that the interaction term of  $T \times D$  had a significantly negative impact on housing prices in Fuyang, with a coefficient of -0.11. This indicates that the price of houses within 6–9 km away from the West Lake District has increased by about 11% less than that of the benchmark group. Column (3) shows that the interaction term  $T \times D$  has a significant negative impact on the house price

of Fuyang, with a coefficient of  $-0.14$ , indicating that the price of houses 9 kilometres away from Hangzhou increased by about 14% less than that of the benchmark group.

**Table 10.** Regression results of the spatial effect of city-county merge of Fuyang on house prices.

	(1)	(2)	(3)
Explanatory variable	ln(P)	ln(P)	ln(P)
West Lake area distance (km)	3–6	6–9	> 9
T × D	0.0624 ** (0.0265)	−0.110 *** (0.0304)	−0.140 *** (0.0299)
Before and after the merge (T)	1.074 *** (0.0147)	1.073 *** (0.0178)	1.078 *** (0.0181)
Distance to West Lake District (D)	−0.123 *** (0.0395)	0.194 *** (0.0635)	0.479 *** (0.0371)
Constant	10.30 *** (0.471)	5.229 *** (0.389)	9.034 *** (0.0761)
Control variables	√	√	√
Observations	2,599	2,248	2,529
R-squared	0.793	0.780	0.756

Standard errors in parentheses; \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

In order to get the statistical difference between each group and the reference group, a Chow test was carried out on the  $T \times A$  regression coefficients of each group and the  $T \times A$  regression coefficients of the reference group. The results are as follows (Table 11).

**Table 11.** The results of Chow test.

	(1) (2)	(1) (3)	(2) (3)
result	chi2(1) = 19.61 Prob > chi2 = 0.0000	chi2(1) = 23.87 Prob > chi2 = 0.0000	chi2(1) = 0.91 Prob > chi2 = 0.3393

Table 11 shows that the  $T \times D$  coefficients of columns (1) and (2) and (3) are significantly different, while the  $T \times D$  coefficients of columns (2) and (3) are not significantly different. Combined with the results in Tables 4 and 6, it can be seen that the overall housing price level has increased just four years after Fuyang's merger. The housing price within 3–6 km from the West Lake District has increased more than that of the benchmark group, indicating that the impact is greater. In contrast, the housing price outside the 6 km point from the West Lake District has increased less than that of the benchmark group, indicating that the impact was less. In conclusion, the city-county merge has a spatial effect on the house prices of Fuyang in the long run, which increases first and then decreases with the increase of the distance from the West Lake District. It was also noted to have the strongest effect on house prices within 3–6 km of the West Lake District.

## 5. Discussion

### 5.1. Topic, Goal, and Methods

The city-county merger is an important way to adjust the administrative division. This paper attempts to analyse the time and spatial effect of the city-county merger on housing prices. Different from what is reported in existing papers, this paper stressed that the city-county merger is a process rather than a time node. Therefore, the social and economic integration in the process of merging must be considered. This paper holds that only when the integration goes on smoothly can the city-county merger have a positive effect on the economy so that house prices can be improved. In addition, the effect will vary with the distance to the urban area.

The double difference method is a common method to evaluate the effect of policy. On this basis, this paper combines the double difference method with the hedonic price model commonly used in the field of real estate research. Through the establishment of the econometric model, this paper makes

an empirical study on the impact of the city-county merger on housing prices in Fuyang, Hangzhou. The purpose is to reveal the time and special effect of the city-county merger on housing prices and to contribute to the empirical research in this field.

## 5.2. Result

### 5.2.1. Time-Effect

The city-county merger will have a time effect on Fuyang housing prices, which will hinder the growth of Fuyang housing prices in the short term but promote the growth of housing prices in the long term. The reason that the housing price growth of Fuyang is hindered in the short term is that the policy of merger is not efficient, which cannot promote the economic development and urbanization of Fuyang in the short term. In order to integrate Fuyang into Hangzhou, Fuyang's urban planning system is integrated into Hangzhou's planning system from the original independent system. Under the planning of Hangzhou, Fuyang District has launched many infrastructure construction projects. Hangzhou municipal government and Fuyang District government have jointly invested in many projects, covering industry, transportation, medical treatment, education, and other aspects such as the construction of an inter-city subway, promoting industrial integration and so on. At the end of 2015, five major industrial projects with an investment of more than 4 billion yuan were started in Fuyang District. However, the process of Fuyang's integration into Hangzhou lasted for a long time, and the measures taken by the government in the short term could not produce an efficient promotion effect. In addition, the draft of *Hangzhou Fuyang Zoning Plan (2017–2020)*, which provides normative guidance for Fuyang development, was completed in September 2018, and many key projects were put forward after 2015. Within one year after the city-county merger, the planning policy was not perfect, and the construction project was still at the starting stage or not even formed yet. Therefore, the development pace and attraction of talent of Fuyang District is still not as good as that of Hangzhou, and neither is the development of Fuyang real estate market.

By the middle of 2018, Fuyang district had made some achievements in construction, and the positive role of the city-county merger had also been revealed. In terms of industry, the listing of Fuyang Development Zone in the National Independent Innovation Demonstration Zone, the opening of Fuyang Park in the Cross-Border E-commerce Comprehensive Pilot Zone, and the opening of Dongzhou International Port can all contribute to economic growth. In the Fuyang plan, it is also clearly proposed that there should be a promotion of the docking of the Fuyang Industrial Platform with the Qiantang River Ecological Economic Belt, Zhijiang Cultural Industrial Belt, and other provincial and municipal industrial platforms. In addition, there should be an acceleration of the construction of industrial innovation base, high-tech manufacturing strong zone and other industrial transformation projects. In the four years since the merger, the Fuyang industry has seen a number of transformations and upgrades, and the progress and completion of various projects have promoted the economic development of Fuyang District.

In addition, the infrastructure construction of the Fuyang District has also been stressed upon. In terms of transportation, the Zhuxian Railway, Hangzhou-Huangdao High-Speed Railway, and other railways opened by the end of 2018. The Hangzhou Fuyang Intercity Railway and other transportation lines related to Fuyang will also be the focus of a speeding up of construction, and Fuyang's transportation will become increasingly convenient. In terms of medical treatment, the Fuyang government has established a close cooperative relationship with Shao Yifu Hospital, Zhejiang People's Hospital, Zhejiang Hospital of Traditional Chinese Medicine, and other top hospitals in the Zhejiang province between 2018 and 2019. For education, Fuyang government has also reached a close cooperative relationship with Zhejiang Normal University and Hangzhou Normal University, the top two normal universities in the province, in order to promote the combination of university resource advantages and local development needs. In addition, Fuyang District also focuses on promoting cultural facilities and sports facility construction projects, such as Fuyang's new library, the Science and

Technology Museum, and the implementation of the upgrading and transformation of Fuyang District's Gymnasium. The infrastructure construction in Fuyang District is thus gradually being fine-tuned.

To sum up, the efficiency of the policy is low in the short term, and the economic level and urban agglomeration effect of Fuyang District are not as good as that of Hangzhou, and thus hinders the house price of Fuyang District. In the long run, however, due to the industrial upgrading and the gradual improvement of infrastructure construction in Fuyang, the economic growth and urbanization of Fuyang is being promoted, and this improves the residents' purchasing power, housing demand, and the expectation of house prices, thereby promoting the growth of housing prices.

### 5.2.2. Spatial-Effect

In the long run, the city-county merger will have a spatial effect on the house price of Fuyang. The development of Fuyang District will be affected by the Hangzhou urban area after the merger of Fuyang, but due to the difference in distance, the influence of each region is markedly different. Four years after the merger, many construction projects in Fuyang had been completed, and the positive impact of the merge had begun to show. Generally speaking, the closer one is to the Hangzhou urban area, the greater is the impact. Firstly, the transportation project between Fuyang and the main urban area is the key project, while the region closest to the main urban area is the most convenient area, and this is more closely connected with the main urban area. Secondly, when the urban development space of Hangzhou becomes insufficient, it will seek to expand outwards. The merger of Fuyang will provide the expansion space for Hangzhou, and the expansion space will be relatively close to the urban area of Hangzhou. For example, the newly built Cross-Border E-Commerce Comprehensive Pilot Zone, Dongzhou international port, and other facilities in Fuyang District are located in the area close to the urban area of Hangzhou, among the planned multiple economic development zones. Most of these are also very close to the urban area, which leads to faster development of the area near the urban area of Hangzhou in Fuyang district and lends itself to a greater role in promoting house prices.

## 6. Conclusions

### 6.1. Key Findings

This paper presents an empirical study on the influence of city-county merge of Fuyang on housing prices and obtains the following key findings:

- (1) In the early stage, the city-county merger had a negative impact on housing prices in Fuyang. This paper puts forward the hypothesis that "the impact of the city-county merger on Fuyang house prices is uncertain in the early stage", because the existing research shows that the improvement of the level of economy and urbanization can promote the growth of house prices, but the impact of the city-county merger on the economic and urbanization level of the merged area is uncertain, so it is impossible to determine the impact of the city-county merger on house prices in the short term. The results of this study show that in a short period of time, the price of houses in Fuyang will fall because of the lack of efficiency of the policy, which cannot play a positive role in the economy and urbanization of Fuyang. The merger of Fuyang into Hangzhou cannot be completed in a short period of time. It will take a long time for the issuance of planning documents or the construction of infrastructure. Therefore, in the early stage after the merger, the development of Fuyang failed to be promoted, and it may even have declined compared with Hangzhou urban area. Therefore, house prices in Fuyang also suffered a negative effect.
- (2) The city-county merge of Fuyang has a time-effect on Fuyang house prices, which hinders the growth of Fuyang house prices in the short term but promotes the house price in the long term. Only under the premise of a good integration of the district and the city can the positive role of a city-county merge be effectively administered. Moreover, it is a long-term process to play a positive role in house prices. In the short run, due to the low efficiency of the policy, the incomplete integration of Fuyang District and Hangzhou City, and the incomplete

construction of corresponding supporting policies and infrastructure, the economic growth and urban agglomeration effect of the Fuyang District would not be as good as that of the original urban area of Hangzhou, so the growth of house prices in Fuyang District is hindered. Conversely, in the long run, it can be seen that Fuyang's "integration into Hangzhou" is progressing smoothly, and Fuyang District's key construction projects have been carried out in their entirety. In addition, industrial upgrading and infrastructure construction have promoted economic growth and urbanization, and the economically developed Hangzhou has the ability to drive the development of Fuyang, thereby promoting the growth of house prices.

- (3) In the long run, the city-county merge of Fuyang has a significant spatial-effect on house prices in Fuyang, and this is an effect that increases first and then decreases. While the impact decreases with distance from the West Lake District, it has a conspicuous effect on house prices within 3–6 km from the West Lake District. The areas closer to the West Lake District are more likely to get any overflow in resources from the urban area, and traffic towards the West Lake District is more convenient. Therefore, there is a greater development opportunity, the economy is more likely to grow rapidly, and house prices will be further promoted.

## 6.2. Public Policy Implications

In this paper, the empirical study has shown that the city-county merge has a time effect and a spatial effect on housing prices, and this can be an important reference for city governments of the same level as Hangzhou, allowing them to better implement the policy of city-county mergers, regulating housing prices, and meeting the housing demands of residents.

- (1) The city-county merger shall follow the principle of adjusting measures to local conditions. The prerequisite for the county (county-level city) to play an active role is the coordinated development of political, economic, social, cultural, and ecological construction in the administrative region. However, it is worth noting that there are huge differences in the natural environment and the human environment of each administrative region in China, and the existing economic level and urbanization level are also uneven. Therefore, a city-county merge cannot be a mechanical imitation. Prior to the implementation of the city-county merge policy, a detailed field investigation and theoretical analysis have to be carried out, and a set of comprehensive plans suitable for the local reality must be formulated in order to provide guidance for integration after the merger.
- (2) Attention should be paid to the follow-up of supporting policies in the adjustment of administrative divisions. The government needs to formulate a series of supporting policies that cover aspects such as industry, transportation, health care, education, and sports, among others, along with policies for the promotion of economic and social development of the merged areas through all-round upgrading. From the case of Fuyang, we can see that it takes time for the city-county merge to begin to play an active role. Therefore, when the government proposes the city-county merge policy, it should start to formulate supporting policies and development plans. This can not only improve the efficiency of the policy and promote the integration process of the district and the city but also promote the economic development and urbanization of the district.
- (3) The government should strengthen the regulation of house prices and improve house price policy. If the positive effects of the city-county merge policy begin to take effect, it is inevitable that the housing prices in the merged areas will rise. The development of the city improves the consumption-ability of the residents, and the residents can thus bear the rise of the housing prices within a reasonable range. However, too high an increase will bring a great burden to consumers. Therefore, the government should consider the time effect and spatial effect of city-county merge when creating a housing price control policy. While preventing the overall change of housing price from being too exponential, it should also keep a close eye on the widening of the difference in the internal housing price level of the area that is being withdrawn and merged and guide consumers in making rational decisions.

### 6.3. Challenges

On the basis of this study, follow-up research can be carried out, but future research also faces challenges. In the process of administrative division adjustment, there will be many factors that have an impact on the effect of the reform, which need more attention in the follow-up study.

- (1) Financial system. It is a long-term process, not a time node, in which social and economic relations will be integrated, but how to integrate is related to the financial system after the merger. If the “district” after the merger still retains independent financial power, then there is a power for the district to develop its own economy, and there is no power for the prefecture level cities to promote integration and economic development; if the “district” after the merger does not have independent financial power, then the prefecture level cities have the power for development, while the district lacks such capacity, so the financial system may be an important influencing factor.
- (2) Economic and social management power. After the merger, whether the district retains the power of economic and social management has an important impact on the effect of the merger. If the power of economic and social management is retained, the district will have autonomy in the process of development, which will lead to higher enthusiasm, but the prefecture-level city may lose power due to small interference space; if the power of economic and social management is collected, the district will be controlled by the prefecture-level city in the process of development, which can reduce efficiency and attack the development enthusiasm of the district.
- (3) The economic development level of the central city. In order to produce radiation effect on the economy of the surrounding cities, it is necessary for the central cities to have certain economic strength. Hangzhou has enough capacity to radiate and drive counties, cities, and districts, but other cities do not necessarily have such capacity, so the economic level of the central city is also one of the influencing factors.

Because of the above factors, the effect of administrative division reform is uncertain. In the follow-up study, we should consider the influence of the above factors and test it through empirical research.

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### References

1. Yu, H.; Deng, Y.; Xu, S. Evolutionary Pattern and Effect of Administrative Divisions Adjustment during Urbanization of China: Empirical Analysis on Multiple Scales. *Chin. Geogr. Sci.* **2018**, *28*, 758–772. [[CrossRef](#)]
2. Ma Laurence, J.C. Urban administrative restructuring, changing scale relations and local economic development in China. *Polit. Geogr.* **2005**, *24*, 477–497.
3. Chung, J.H.; Lam, T.C. China’s “City System” in Flux: Explaining Post-Mao Administrative Changes. *China Q.* **2004**, *180*, 945–964. [[CrossRef](#)]
4. Fan, S.; Li, L.; Zhang, X. Challenges of creating cities in China: Lessons from a short-lived county-to-city upgrading policy. *J. Comp. Econ.* **2012**, *40*, 476–491. [[CrossRef](#)]

5. Wu, J.; Liao, C. *Scale Rescaling and Rescaling of Territoriality: 40 Years of Adjustment of China's Urban Administrative Divisions*; Shanghai Jiao Tong University Press: Shanghai, China, 2018.
6. Tang, W.; Wang, Y. Administrative Boundary Adjustment and Urbanization of Population: Evidence from City-county Merger in China. *Econ. Res. J.* **2015**, *50*, 72–85.
7. Luo, Z.; Wang, X.; Geng, L. Stages and Characteristics of Metropolitan Administrative Division Adjustment in China since 1997. *China City Plan. Rev.* **2014**, *3*, 6–14.
8. Li, X. Impact analysis of turning counties (cities) into districts to the urban economic growth in China. *Acta Geogr. Sin.* **2015**, *70*, 1202–1214.
9. Martin, L.L.; Schiff, J.H. City-county consolidations: Promise versus performance. *State Local Gov. Rev.* **2011**, *43*, 167–177. [[CrossRef](#)]
10. McKay, R.B. Reforming municipal services after amalgamation: The challenge of efficiency. *Int. J. Public Sect. Manag.* **2004**, *17*, 24–47. [[CrossRef](#)]
11. Smith, R.M.; Afonso, W.B. Fiscal Impact of Annexation Methodology on Municipal Finances in North Carolina. *Growth Chang.* **2016**, *47*, 664–681. [[CrossRef](#)]
12. Swanson, B.E. Quandaries of pragmatic reform: A reassessment of the Jacksonville experience. *State Local Gov. Rev.* **2000**, *32*, 227–238.
13. Nelson, A.C.; Kathryn, A.F. Metropolitan governance structure and income growth. *J. Urban. Aff.* **1999**, *21*, 3309–3325. [[CrossRef](#)]
14. Feiock, R.C.; Carr, J.B. A reassessment of city-county consolidation: Economic development impacts. *State Local Gov. Rev.* **1997**, *29*, 166–171. [[CrossRef](#)]
15. Carr, J.B.; Feiock, R.C. Metropolitan government and economic development. *Urban. Aff. Rev.* **1999**, *34*, 476–489. [[CrossRef](#)]
16. Forbes, K.F.; Zampelli, E.M. Is leviathan a mythical beast? *Am. Econ. Rev.* **1989**, *79*, 568–577.
17. Savitch, H.V.; Vogel, R.K. Metropolitan consolidation versus metropolitan governance in Louisville. *State Local Gov. Rev.* **2000**, *32*, 198–212. [[CrossRef](#)]
18. Boyne, G.A. Local government structure and performance: Lessons from America. *Public Adm.* **1992**, *70*, 332–357. [[CrossRef](#)]
19. Hudnut, W. *The Hudnut Years in Indianapolis*; Indiana University Press: Bloomington, IN, USA, 1995.
20. Faulk, D.; Hicks, M. *Local Government Consolidation in the United States*; Cambria Press: New York, NY, USA, 2011.
21. Savitch, H.V.; Vogel, R.K.; Ye, L. Beyond the Rhetoric Lessons from Louisville's Consolidation. *Am. Rev. Public Adm.* **2010**, *40*, 3–28. [[CrossRef](#)]
22. Qian, Y.Y.; Weingast, B.R. Federalism as commitment to preserving market incentives. *J. Econ. Perspect.* **1997**, *11*, 83–92. [[CrossRef](#)]
23. Wang, X.; Nie, H. Administrative divisions' adjustment and economic growth. *Manag. World* **2010**, *4*, 42–53.
24. Shi, Y.; Xu, Y. Impact of adjustment of administrative divisions upon the changes of housing prices—the case of Nanhui district merged into Pudong new area. *Econ. Geogr.* **2011**, *31*, 1452–1457.
25. Raymond, E.S.; Menifield, C.E. A Tale of Two Cities: An Exploratory Study of Consolidation and Annexation Policies in the Cities of Memphis and Nashville. *Public Adm. Q.* **2011**, *35*, 404–441.
26. Vogiazas, S.; Alexiou, C. Determinants of housing prices and bubble detection: Evidence from seven advanced economies. *Atl. Econ. J.* **2017**, *45*, 119–131. [[CrossRef](#)]
27. Kishor, N.K.; Marfatia, H.A. The dynamic relationship between housing prices and the macroeconomy: Evidence from OECD countries. *J. Real Estate Financ. Econ.* **2017**, *54*, 237–268. [[CrossRef](#)]
28. Kuang, W. Expectation, Speculation and Urban Housing Price Volatility in China. *Econ. Res. J.* **2010**, *45*, 67–78.
29. Wang, X.R.; Hui, E.C.M.; Sun, J.X. Population migration, urbanization and housing prices: Evidence from the cities in China. *Habitat Int.* **2017**, *66*, 49–56. [[CrossRef](#)]
30. Wang, F.; Zhang, C. Impacts of administrative division adjustment on housing price in urban China. *Geogr. Res.* **2017**, *36*, 913–925.
31. Wu, J.; Fu, R. Integration and Dispersion: Administrative Division Reform in Regional Governance. *Comp. Econ. Soc. Syst.* **2017**, *1*, 145–154.
32. Roesel, F. Do mergers of large local governments reduce expenditures? Evidence from Germany using the synthetic control method. *Eur. J. Polit. Econ.* **2017**, *50*, 22–36. [[CrossRef](#)]



33. Steiner, R.; Kaiser, C.; Grétar Thór, E. A Comparative Analysis of Amalgamation Reforms in Selected European Countries. In *Local Public Sector Reforms in Times of Crisis*; Palgrave Macmillan: London, UK, 2016.
34. Norton, A. *International Handbook of Local and Regional Government*; Edward Elgar Pub.: Cheltenham, UK, 1994.
35. Alwyn, Y. The razor's edge: Distortions and incremental reform in the People's Republic of China. *Q. J. Econ.* **2000**, *115*, 1091–1135.
36. Mai, J.; Yu, T.; Jiang, Z. The effect of China's province governing the county system reform on urban-regional relationship of the Yangtze River Delta and some targeted counter measures. *Urban Stud.* **2010**, *5*, 80–85.
37. Dolan, D. Fragmentation: Does it drive up the costs of government? *Urban Aff. Q.* **1990**, *26*, 28–45. [[CrossRef](#)]
38. Selden, S.C.; Richard, W. The expenditure impacts of unification in a small Georgia county: A contingency perspective of city-county consolidation. *Public Adm. Q.* **2000**, *24*, 169–201.
39. Faulk, D.; Grassmuck, G. City-county Consolidation and Local Government Expenditures. *State Local Gov. Rev.* **2012**, *44*, 196–205. [[CrossRef](#)]
40. Carr, J.B.; Bue, S.; Lu, W. City-County government and promises of economic development: A tale of two cities. *State Local Gov. Rev.* **2006**, *38*, 131–141. [[CrossRef](#)]
41. Stansel, D. Local decentralization and local economic growth: A cross-sectional examination of US metropolitan areas. *J. Urban Econ.* **2005**, *57*, 55–72. [[CrossRef](#)]
42. Henderson, C.C.A.V. Are Chinese Cities Too Small? *Rev. Econ. Stud.* **2006**, *73*, 549–576.
43. Duranton, G.; Puga, D. Micro-foundations of urban agglomeration economies. *CEPR Discuss. Pap.* **2003**, *4*, 2063–2117.
44. Boarnet, M.G.; Haughwout, A. Do Highways Matter? Evidence and Policy Implications of Highways' Influence on Metropolitan Development (Discussion Paper). Available online: <https://escholarship.org/content/qt5rn9w6bz/qt5rn9w6bz.pdf> (accessed on 20 February 2020).
45. Fields, R. Response to the Draft Environmental Impact Statement for the Louisville-Southern Indiana Ohio River Bridges Project. Louisville. Available online: [https://books.google.com.ph/books?id=kVA3DAAAQBAJ&pg=PT231&lpg=PT231&dq=Response+to+the+draft+environmental+impact+statement+for+the+Louisville-Southern+Indiana+Ohio+River+Bridges+Project.+Louisville&source=bl&ots=ZGS\\_LPN-JN&sig=ACfU3U3YjXLxrbzowp2-pyBXArCdXTO4DA&hl=zh-CN&sa=X&ved=2ahUKEwi-zNXttt\\_nAhWZ7WEKHdhSDuYQ6AEwAXoECAoQAQ#v=onepage&q=Response%20to%20the%20draft%20environmental%20impact%20statement%20for%20the%20Louisville-Southern%20Indiana%20Ohio%20River%20Bridges%20Project.%20Louisville&f=false](https://books.google.com.ph/books?id=kVA3DAAAQBAJ&pg=PT231&lpg=PT231&dq=Response+to+the+draft+environmental+impact+statement+for+the+Louisville-Southern+Indiana+Ohio+River+Bridges+Project.+Louisville&source=bl&ots=ZGS_LPN-JN&sig=ACfU3U3YjXLxrbzowp2-pyBXArCdXTO4DA&hl=zh-CN&sa=X&ved=2ahUKEwi-zNXttt_nAhWZ7WEKHdhSDuYQ6AEwAXoECAoQAQ#v=onepage&q=Response%20to%20the%20draft%20environmental%20impact%20statement%20for%20the%20Louisville-Southern%20Indiana%20Ohio%20River%20Bridges%20Project.%20Louisville&f=false) (accessed on 20 February 2020).
46. Wang, Z.; Zhang, Q. Fundamental factors in the housing markets of China. *J. Hous. Econ.* **2014**, *25*, 53–61. [[CrossRef](#)]
47. Glaeser, E.L.; Gyourko, J.; Saks, R.E. Why have housing prices gone up? *Am. Econ. Rev.* **2005**, *95*, 329–333. [[CrossRef](#)]
48. Saiz, A. The geographic determinants of housing supply. *Q. J. Econ.* **2010**, *125*, 1253–1296. [[CrossRef](#)]
49. Mankiw, N.G.; Weil, D.N. The baby boom, the baby bust, and the housing market. *Reg. Sci. Urban Econ.* **1989**, *19*, 235–258. [[CrossRef](#)]
50. Drachal, K. Property Prices and Regional Labor Markets in Poland. *Singidunum J. Appl. Sci.* **2014**, *11*, 5–15. [[CrossRef](#)]
51. Égert Balázs Mihaljek, D. Determinants of House Prices in Central and Eastern Europe. *Comp. Econ. Stud.* **2007**, *49*, 367–388. [[CrossRef](#)]
52. Iacoviello, M. House Prices and the Macroeconomy in Europe: Results from a Structural VAR Analysis. *Eur. Cent. Bank Work. Paper Ser.* **2000**, *18*, 1–42.
53. Tse, R.Y. Estimating neighborhood effects in house prices: Towards a new hedonic model approach. *Urban Stud.* **2002**, *39*, 1165–1180. [[CrossRef](#)]
54. Goodman, A.C.; Thibodeau, T.G. Housing market segmentation and hedonic prediction accuracy. *J. Hous. Econ.* **2003**, *12*, 181–201. [[CrossRef](#)]
55. Freeman, A.M. Hedonic prices, property values and measuring environmental benefits: A survey of the issues. *Scand. J. Econ.* **1981**, *81*, 13–32.
56. Wen, H.; Lu, J.; Fu, Y. Product differentiation and hedonic prices: An empirical analysis. In Proceedings of the ICSSM '05—2005 International Conference on Services Systems and Services Management, Chongqing, China, 13–15 June 2005.

57. Wen, H.Z.; Sheng-hua, J.; Xiao-yu, G. Hedonic price analysis of urban housing: An empirical research on Hangzhou, China. *J. Zhejiang Univ. Sci. A* **2005**, *6*, 907–914. [CrossRef]
58. Chay, K.Y.; Greenstone, M. Does air quality matter? Evidence from the housing market. *J. Polit. Econ.* **2005**, *113*, 376–424. [CrossRef]
59. Grainger, C.A. The distributional effects of pollution regulations: Do renters fully pay for cleaner air? *J. Public Econ.* **2012**, *96*, 840–852. [CrossRef]
60. Zheng, S.; Kahn, M.E. Land and residential property markets in a booming economy: New evidence from Beijing. *J. Urban Econ.* **2008**, *63*, 743–757. [CrossRef]
61. Gamper-Rabindran, S.; Mastromonaco, R.; Timmins, C. Valuing the benefits of superfund site remediation: Three approaches to measuring localized externalities. *Natl. Bureau Econ. Res.* **2011**, 16655, 1–78.
62. Yue, W.; Ni, C.; Tian, C.; Wen, H.; Fang, L. Impacts of an Urban Environmental Event on Housing Prices: Evidence from the Hangzhou Pesticide Plant Incident. Available online: [https://www.researchgate.net/publication/222077522\\_Impacts\\_of\\_urban\\_environmental\\_element\\_on\\_residential\\_housing\\_prices\\_in\\_Guangzhou\\_China](https://www.researchgate.net/publication/222077522_Impacts_of_urban_environmental_element_on_residential_housing_prices_in_Guangzhou_China) (accessed on 20 February 2020).
63. Mahan, B.L.; Polasky, S.; Adams, R.M. Valuing urban wetlands: A property price approach. *Land Econ.* **2000**, *76*, 100–113. [CrossRef]
64. Wen, H.; Bu, X.; Qin, Z. Spatial effect of lake landscape on housing price: A case study of the West Lake in Hangzhou, China. *Habitat Int.* **2014**, *44*, 31–40. [CrossRef]
65. Peiser, R.B.; Schwann, G.M. The private value of public open space within subdivisions. *J. Archit. Plan. Res.* **1993**, *10*, 91–104.
66. Dubin, R.A.; Goodman, A.C. Valuation of education and crime neighborhood characteristics through hedonic housing prices. *Popul. Environ.* **1982**, *5*, 166–181. [CrossRef]
67. Bishop, K.C.; Murphy, A.D. Estimating the willingness to pay to avoid violent crime: A dynamic approach. *Am. Econ. Rev.* **2011**, *101*, 625–629. [CrossRef]
68. Bogart, W.T.; Cromwell, B.A. How Much Is a Neighborhood School Worth? *J. Urban Econ.* **2000**, *47*, 280–305. [CrossRef]
69. Wen, H.; Xiao, Y.; Zhang, L. School district, education quality, and housing price: Evidence from a natural experiment in Hangzhou, China. *Cities* **2017**, *66*, 72–80. [CrossRef]
70. Sah, V.; Conroy, S.J.; Narwold, A. Estimating school proximity effects on housing prices: The importance of robust spatial controls in hedonic estimations. *J. Real Estate Financ. Econ.* **2016**, *53*, 50–76. [CrossRef]
71. Collins, C.A.; Kaplan, E.K. Capitalization of School Quality in Housing Prices: Evidence from Boundary Changes in Shelby County, Tennessee. *Am. Econ. Rev.* **2017**, *107*, 628–632. [CrossRef]
72. Bajic, V. The Effects of a New Subway Line on Housing Prices in Metropolitan Toronto. *Urban Stud.* **1983**, *20*, 147–158. [CrossRef]
73. Billings, S. Estimating the Value of a New Transit Option. *Reg. Sci. Urban Econ.* **2011**, *41*, 525–536. [CrossRef]
74. Wen, H.; Gui, Z.; Tian, C.; Xiao, Y.; Li, F. Subway Opening, Traffic Accessibility, and Housing Prices: A Quantile Hedonic Analysis in Hangzhou, China. *Sustainability* **2018**, *10*, 2254. [CrossRef]
75. Dubé, J.; Thériault, M.; Rosiers, F.D. Commuter rail accessibility and house values: The case of the Montreal South Shore, Canada, 1992–2009. *Transp. Res. Part A Policy Pract.* **2013**, *54*, 49–66. [CrossRef]
76. Gibbs, C.; Guttentag, D.; Gretzel, U. Pricing in the sharing economy: A hedonic pricing model applied to Airbnb listings. *J. Travel Tour. Mark.* **2017**, *35*, 46–56. [CrossRef]

