Chapter 4 The Relationship between Housing Prices and Urban Competitiveness: A Theoretical Framework

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Housing is a necessity for human living and development. In the urban world, housing has multiple impacts. Accordingly, the housing price that involves benefits and costs has an important influence on market agents. As far as cities are concerned, the housing price and its volatility are closely related to the rise and fall of cities, the volatility of the world economy, as well as the evolution of economic space and pattern[2]. For a single city, housing has dual attributes of consumer goods and investment goods. For one thing, the housing sector is an important sector for providing residents with basic housing services in an urban economy, and directly affects the utility level of urban residents; meanwhile, housing investment is an important component in urban fixed asset investment, and can exert a significant influence on urban economic growth through the multiplier effect of investment. For another, the volatility of the housing price can affect the living cost of residents and the production cost of firms and then changes the volume of human capital and industrial structure in cities. In addition, due to its attribute as an investment good, the price of housing also affects macroeconomics through the financial market. Therefore, housing and its price are always important factors for urban economic growth and structural transformation.

In the current context of globalization, with the increasing integration of interregional markets, spatial flows and interactions of factors and industries between cities have become more active and frequent. Housing, as a kind of non-tradable good that often results in great differences in living and production conditions between regions, has a significant influence on spatial flows of factors and industries and their interactions. Particularly in the urban system, because the flows between different product and factor markets are much stronger, the changes in relative housing prices between cities always have significant impacts on the structure and scale of urban systems through the flows of factors and industries.

In view of the important influence of housing prices on cities and urban systems, we have built a model based on relevant basic economic theories, and try to explain the relationships between housing price and urban competitiveness in this part. Nevertheless, to reach a wide readability, we express relevant mathematical models in qualitative terms.

4.1 Basic Assumption

Suppose there are two cities in the region (city 1 and city 2), and trade and factors are flowing between the two cities. Each of the two cities has manufacturing and housing sectors. The manufacturing sector produces differentiated manufactured goods, and each firm produces only one type of manufactured good; while the housing sector produces housing commodities. Meanwhile, manufacturing firms are homogeneous between cities, and only use labour as an input factor; labour

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2 The theoretical analysis of this paper applies mainly to the industrial society. In the agricultural society, the under-developed urban and real estate sector is not the focus of the theoretical analysis.

is classified into two categories: skilled labour and unskilled labour. Specifically, manufacturing firms use unskilled labour as a variable input and one unit of skilled labour as a fixed input, which means that the amount of skilled labour equals the number of manufacturing firms. Because skilled labour can flow freely between cities, the city with a larger volume of skilled labour has a bigger share of the manufacturing industry. Moreover, unskilled labour is evenly distributed between cities, and its supply in each city is perfectly elastic. This means that the wage of unskilled labour is constant and equal between cities. The basic assumptions of the residential, manufacturing and real estate sectors are explained respectively, as follows.

1. Residential Sector

Residents have diversified preferences, and consume differentiated manufactured goods and housing services, subject to certain income constraints. Thus we can derive residents' demand function for housing and manufactured goods. Specifically, when residents' income is higher and the price of housing and manufactured goods is lower, residents' utility level and demands for housing and manufactured goods are greater.

2. Manufacturing Sector

The manufacturing sector is monopolistic competition. Manufacturing firms produce manufactured goods using the technology of increasing returns to scale. The trade of manufactured goods assumes iceberg transportation cost. Therefore, we can derive the pricing of manufactured goods as a constant in the city where they are produced, while the pricing in other cities is a linear function of the transportation cost. The higher the transportation cost, the higher the pricing in other cities.

3. Housing Sector

The housing sector is an example of perfect competition. Based on the assumption of Helpman (1998), the total housing supply of city 1 and city 2 is completely inelastic and is an exogenous variable. The equilibrium of the housing market can directly determine the equilibrium housing price in each city. In this case, the higher the resident income and the smaller the total housing supply, the higher the housing price.

4. Long-term Equilibrium

The long-term equilibrium for the flows of skilled labour is determined by their utilities in cities. Specifically, in each city, skilled labour's utility equals the city's aggregated price index divided by the nominal wage, which is the city's aggregated price index, which is composed of the housing price and the manufactured goods price. Therefore, in the long run equilibrium, the utility level of skilled labour in city 1 and city 2 is the same.

5. The Determinants of Urban Competitiveness

We take the income of each city's residents as the proxy variable for urban competitiveness. In the model, it is assumed that the residents' income only comes from wages. Because city 1 and city 2 have the same wage for unskilled labour, but a different wage for skilled labour. Therefore, we measure the competitiveness of each city by the nominal wage of its skilled labour.

In the theoretical model, because each manufacturing firm only uses one unit of skilled labour as a fixed cost, all of its operating profit (operating profit = total revenues – total variable costs) is used to pay the wage of skilled labour. Specifically, the operating profit of a single manufacturing firm in the model (namely the urban competitiveness) depends on two factors:

(1) Total urban income. Because residents have diversified preferences, manufactured goods produced by a single manufacturing firm would be consumed by all the residents. Accordingly, the higher the total residents' income in the city, the greater the demand for each manufacturing firm and the higher its operating profit becomes, and the higher the wages it pays to skilled labour. By then, the city becomes more competitive. The city's total income consists of the following two parts:

Total urban income = total wage + total income from the housing sector

Specifically, the larger the number of manufacturing firms or skilled labour in the city, the higher the total wages. As in the case of Helpman (1998), we assume that the total income from the housing sector in the economy is evenly distributed among skilled labour. Therefore, the cities with a larger amount of skilled labour (namely the larger number of manufacturing firms) can obtain more housing revenue. Accordingly, we draw the following conclusion:

Cities with a bigger share of the manufacturing industry (in terms of the total number of manufacturing firms) have higher total urban income and a larger demand for each manufacturing firm. In this case, skilled labour can obtain higher wages, which therefore contributes to higher urban competitiveness.

(2) The total number of manufacturing firms. The demand for a single manufactured good depends on both the manufactured good's price and the total number of manufacturing firms in the city where the firm is located. Specifically, the larger the number of manufacturing firms in the city, the more differentiated products residents can consume, and the lower the demand for each manufactured good becomes. The negative correlation between the demand for a single manufactured good

and the total number of firms is called the "market congestion effect", which is also a typical characteristic of the monopolistic competition model of Dixit and Stiglitz (1977). Accordingly, we conclude that:

Cities with a bigger share of manufacturing industry (in terms of the total number of manufacturing firms) have a bigger market congestion effect, a lower demand for each manufactured good and a reduced wage for skilled labour, and thus lower urban competitiveness.

It can be found that the share of the manufacturing sector has two opposite effects on urban competitiveness, which also complicates the analysis of urban competitiveness.

4.2 Two Effects of Housing prices on Urban Competitiveness

The volatility of housing prices would result in changes in the utility level of skilled labour, the flow of manufacturing firms between city 1 and city 2, and then the changes of the urban manufacturing sector's share. Specifically, the impact of housing prices on urban competitiveness has two opposite effects as shown in Figure 1:

4.2.1 "Market congestion effect".

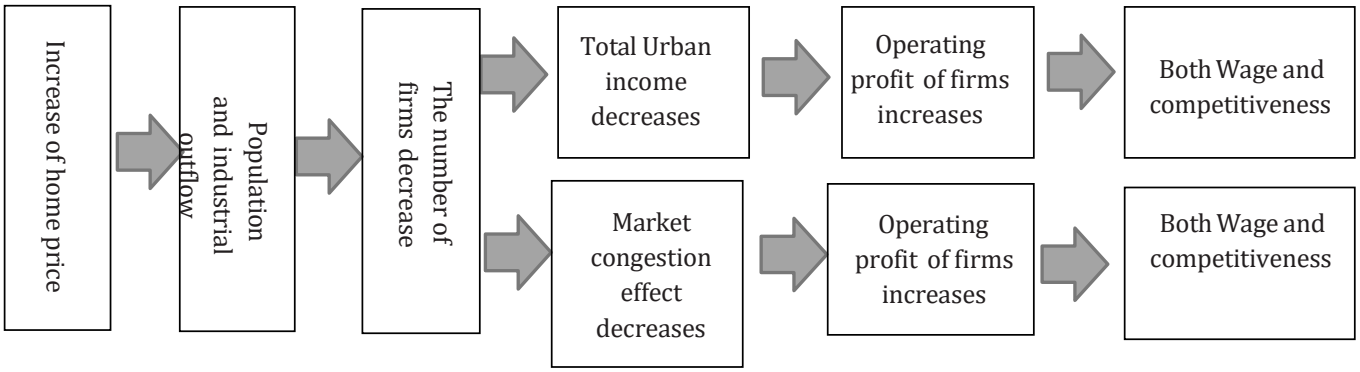
Specifically, the rise in housing prices would force manufacturing firms to leave the local market, and causes a decreasing "market congestion effect". Hence, the demand for each manufacturing firm becomes bigger, leading to the increase in the wages of skilled labour, and firms improving urban competitiveness.

4.2.2 "Income effect".

The rise in housing prices would force manufacturing firms out of the local market, causes the number of manufacturing firms to decrease, then reduces total urban income and product demand of each manufacturing firm, finally leading to the decrease in the wage of skilled labour and urban competitiveness. In contrast, the fall in housing prices attracts manufacturing firms into the local market, increases urban income and urban competitiveness.

In the following chart, the increase in housing prices is taken as an example to illustrate the two effects of the housing price on urban competitiveness.

Figure 1 Two effects of the housing price on urban competitiveness



Obviously, the changes in housing prices have two opposite effects on urban competitiveness, indicating a nonlinear relationship between housing price and urban competitiveness.

4.3 Simulation Results for Relationships between Housing prices and Urban Competitiveness in the Long-Term Equilibrium

To simulate the changes in housing prices, we suppose the total housing supply of city 2 remains constant, the total housing supply of city 1 is smaller than that of city 2 at first and then gradually increases until it is larger than city 2. This means that we impose a growing negative shock on the housing price of city 1. That is to say, we first lower the housing price of city 1[3], and then observe the relationship between the housing price and urban competitiveness in the long-term equilibrium.

It must be emphasized that a negative shock on the housing price of city 1 means the utility level of skilled labour in city 1 increases, which would cause skilled labour flow from city 2 to city 1, leading to a larger industrial share of city 1. Therefore, in the following analysis, the industry always shifts from city 2 to city 1. In other words, the industrial share of city 1 keeps increasing, while that of city 2 keeps decreasing. It must be emphasized again that all of the following conclusions are based on the long-term equilibrium. The simulation results are shown in figure 2.

4.3.1 There exists an inverted "U" relationship between a city's housing price and its competitiveness.

According to Figure 2, the changes in urban competitiveness in city 1 and city 2 are both the shape of an inverted "U". That is to say, if one city has a higher housing price than other cities, the city's competitiveness will increase and then decrease. Specifically, when the housing price of city 1 is located in different ranges, there are four changes in the competitiveness of city 1 and city 2:

Range 1: In the case where city 1 has a higher housing price than city 2, the competitiveness of city 1 and city 2 would both increase. This is because, as the industrial share of city 1 keeps increasing, the "Income effect" plays the leading role, and the total income of city 1 increases, which improves the urban competitiveness. In the meantime, because the "market congestion effect" of city 2 plays a leading role, the decreasing industry share of city 2 would increase competitiveness. In this case, because the industrial share of city 2 is significantly larger than that of city 1, city 1 would be regarded as a small city in the region, whereas city 2 would be regarded as a big city.

Range 2: In the case where city 1 has a higher housing price than city 2, the competitiveness of city 1 would increase, whereas that of city 2 would decrease. In this range, the industrial share of city 2 shrinks, whereas that of city 1 expands. Because the "Income effect" of both cities plays a leading role, the competitiveness of city 1 would increase, whereas that of city 2 would decrease. In this case, because the industrial share of city 2 is still higher than that of city 1, city 1 would be regarded as a small city in the area, whereas city 2 would be regarded as a big city.

Range 3: In the case where city 1 has a higher housing price than city 2, the competitiveness of city 1 would continue to increase, whereas that of city 2 would continue to decrease. This is because the "Income effect" still plays a leading role in this range. However, unlike range 2, range 3 shows the continuous industrial transfer from city 2 to city 1; in this case, the housing price of city 1 is higher than that of city 2. In terms of industrial share, city 1 is a big city, whereas city 2 is a small city.

Range 4: In the case where city 1 has a higher housing price than city 2, the competitiveness of both city 1 and city 2 would decrease. In this range, the "market congestion effect" plays a leading role in city 1, whereas the "Income effect" plays a leading role in city 2, both of which would cause a downtrend in the competitiveness of city 1 and city 2. In the meantime, because the industrial share of city 1 is significantly larger than that of city 2, city 1 is a big city, whereas city 2 is a small city.

We will further summarize the above four cases in the following table:

3 The same conclusion can also be derived by imposing a positive shock on the housing price of city 1.

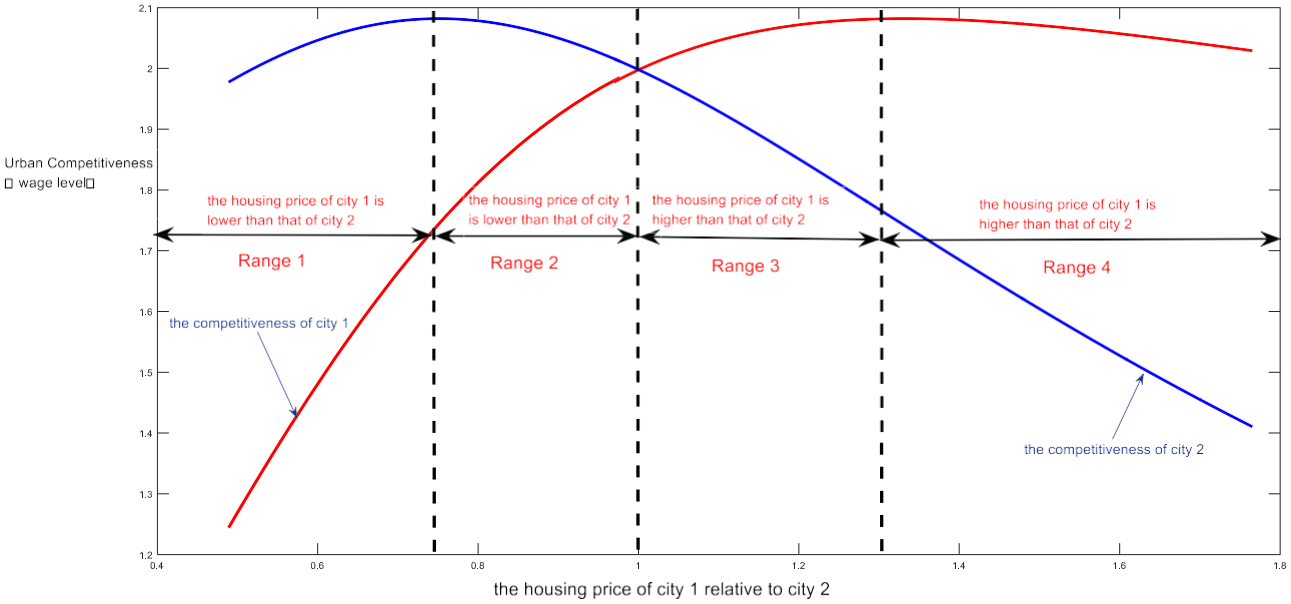
Table 1 Changes in the competitiveness of city 1 and city 2 within different ranges

City 1's housing price relative to that of city 2	Range 1	Range 2	Range 3	Range 4
Urban competitiveness level	City 1 < city 2	City 1 < city 2	City 1 > city 2	City 1 > city 2
Competitiveness of city 1	Increase	Increase	Increase	Decrease
Competitiveness of city 2	Increase	Decrease	Decrease	Decrease
Housing price	city 1 <city 2	city 1 <city 2	city 1 >city 2	city 1 >city 2
Industrial share	city 1 <city 2	city 1 <city 2	city 1 >city 2	city 1 >city 2
Skilled labour and industrial flow direction	Flow from city 2 to city 1	Flow from city 2 to city 1	Flow from city 2 to city 1	Flow from city 2 to city 1
Leading effect in city 1	Income effect	Income effect	Income effect	Market congest effect
Leading effect in city 2	Market congest effect	Income effect	Income effect	Income effect

4.3.2 The higher a city's housing price, the more competitive the city.

As shown in Figure 2, when the housing price of city 1 is lower than that of city 2, the competitiveness of city 1 is also lower than that of city 2; when the housing price of city 1 is higher than that of city 2, the competitiveness of city 1 is also higher than that of city 2.

Figure 2 Different impacts of the housing price on urban competitiveness



4.4 Conclusions

Through the above theoretical analysis, we infer that:

4.4.1 An inverted "U" relationship exists between a city's relative housing price and its urban competitiveness, indicating that both excessively high and excessively low housing prices are unfavourable to the improvement of urban competitiveness.

4.4.2 The city with a higher relative housing price is more competitive.

4.4.3 In the case of significant disparities of housing prices between the large and small cities in a region, the competitiveness of all cities decreases.

When the housing price of the big city is significantly higher than that of the small city, the increase in housing price in the small city relative to the big city indicates that the housing price differences between cities become smaller, and will improve the competitiveness of all cities. On the contrary, the increase in the housing price in the big city relative to the small city will decrease the competitiveness of all cities.

4.4.4 In the case of weak disparities in housing price between the large and small cities, the city's own housing price has a negative correlation with the competitiveness of other cities.

When the housing price of the big city is higher than that of the small city, the increase in the housing price in the small city is favourable to the improvement of the small city's competitiveness but unfavourable to the improvement of the big city's competitiveness; contrarily, the increase in the housing price in the big city is favourable to the improvement of the big city's competitiveness but unfavourable to the improvement of the small city's competitiveness. This indicates that changes in housing price would lead to competition in urban competitiveness between different cities.

Through the above analysis, we could conclude that the housing price is an important force for changing cities and the world, and has a significant influence on urban competitiveness. For a single city, because housing price and competitiveness have an inverted "U" relationship, neither excessively high nor excessively low housing price is good for the improvement of urban competitiveness. In the urban system, housing price differences between cities can affect the competitiveness of all cities. This is mainly because the housing price is an important force affecting intercity flows of factors and goods. In the case of significant disparities in housing price between large and small cities, all cities' competitiveness decreases. Hence, the housing price within a rational range is favourable to the improvement of the competitiveness of a single city or city system. As the most important form of agglomeration economies in a region or country, cities play an important role in regional and national economic development. In this sense, the urban housing price would also have an important influence on the economic development of a country and the overall economic structure of the world.

References

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