Topic: the Effects of Expected High-Speed Railway Project on House Prices

How accessibility to transportation affects the prices of houses has been a subject that has been widely investigated in real estate and economics research. In this study, I propose to pursue this topic again, and this time using the evidence of the latest transportation construction plan in Taiwan, namely, the proposal for a new station of Taiwan High-Speed Rail (THSR). The THSR connects the northern part of Taiwan, Taipei, all the way down to the southern part, Kaohsiung, spanning a total distance of 350 km. In 2019, the government announced the Railway will be extended from Taipei to the eastern county, Yilan. In this research study, I want to measure how house prices change because of the construction plan.

A public construction plan has different stages of publicizing. Following Yiu and Wong (2005), I plan to exploit the differences in the stages. According to official records, as early as 2017, the evaluation of the construction had started, but no formal proposal was raised. It was not until 2019 did the plan become known publicly when the then Minister of Transportation announced the proposal for a new THSR station in Yilan. I call the period after the announcement the first stage. Then in February 2021, 4 sites in Yilan were chosen as the candidates for the THSR station, after which I call the second stage. The third stage came after December 2021, when the Government announced the final decision on the location among the four.

My hypothesis is that the price of the houses would reflect people's expectations of the accessibility to the THSR station in the future. In the first stage, after the announcement, although there was some speculation, the information about the station's location was not clear. I expect to see an overall rise in house prices in Yilan after the announcement. In the second stage, I expect to see a more obvious increase around the 4 proposed locations. Finally, in the third stage, the areas around the winning location would have the most obvious growth among the four sites in house prices.

More detailedly, I plan to apply the hedonic model to measure the premium of expected accessibility to the THSR station. I would like to use a semi-DID design with 4 stages: pre-announcement stage, stage 1, stage 2, and stage 3, which means the hedonic model for the price of a house includes the interaction term of the stage in which the transaction is made and expected accessibility of the address. And I would like to try three different kinds of expected accessibility: (a) dummy variables of the house located within a certain distance, say, 1 km, to the candidate locations, (b) continuous distance from the nearest locations, and (c) discrete bins of the distance (gradients) from the locations.

For the data sources, I will use the data set published by the Taiwan Dept of Land Administration, which contains details of all real estate transactions each season, including the exact house address, price, usage, area, date of transaction, etc. Starting

in 2012, the law requires each transaction of real estate to be recorded, creating a rich source of house price data.

Literature review

The classical theory of travel cost and house prices can be traced back to von Thünen (1826), who posits that the rent of a property is inversely related to its distance to the market. Stemmed from von Thünen's agriculture-focused model, Alonso et al (1964), Mills (1967) and Muth (1969) further developed the monocentric urban land use model, called the "bid rent theory", focusing on how house prices change as the distance from the central business district (CBD) increases, where the bid rent refers to the land user's willingness to pay for the accessibility to the CBD.

This research would serve as a piece of evidence for the theory above by showing the decrease in travel costs to the CBD (in this case, Taipei) will lead to an increase in housing prices. There have been several related studies done examining the effect of improvement in transportation. For example, Debrezion et al. (2006) use the hedonic model on the Dutch housing price data from 1985-2001 to conclude houses that are close to the station are 25% more expensive than houses that are at a 15 km or longer distance; Levkovich et al. (2015) explores the effect of highway development on housing price, also in the Netherlands, with repeat sales and DID method, and finds a positive effect of proximity to the highway on housing price; Mohammad et al. (2013) conducts meta-analysis on 23 empirical studies, mostly in the US, and finds that the distance to railway stations has a positive relationship with the house prices and that the change in the purchase price is actually similar across the studies.

As opposed to the extensive evidence found in Europe and the US, the studies focused on East Asia provide relatively weaker evidence, some due to a lack of good quality data (e.g., Andersson et al., 2010; Hu, 2010), and some due to imprecise measurement (e.g., Geng et al., 2015). However, the investigation of the question in East Asia remains important as we are currently observing a large number of ongoing and planned constructions of transportation infrastructure in East Asian countries, and the effect on real estate prices may be different from the western countries because of differences such as house owning culture.

Another strand of literature related to this research is the effect of expected accessibility to transportation. The existing literature studying the dynamics of price uses the timing of the completion or the opening of the transportation as the shock of the transportation (e.g., Levkovich et al., 2015). However, this would likely be an underestimate of the change since the price of the housing would be likely to increase right after the announcement of the project and well before the opening of the service due to the expected increase in accessibility. There are a few articles focusing on the expected increase in accessibility, such as Yiu & Wong (2005) and Bao et al. (2021) investigating the effect of expected tunnels on housing prices, and Cengiz et al. (2022)

find that the average increase in house prices before construction is greater than the increase after the construction had started.

Why is my approach better?

Most of the studies measuring the effect of transportation are conducted using cross-sectional data. However, only using the cross-sectional data would suffer from endogeneity problems, such as omitted variable bias. It is possible that transport infrastructure is chosen to be built in a neighborhood with certain traits that are not included in the hedonic model. This study, however, proposes a semi-DID design. Not only does the design preserve the benefits of the hedonic model, but it also incorporates the spirit of a control group. Using the “losing” locations for the THSR station as control, we can ensure that the treated and controlled locations share important characteristics in common, for example, proximity to the township center and train stations.

Additionally, this paper would use the data set made available due to the enforcement in 2012 of a law in Taiwan requiring the registration of the actual selling price in real estate transactions. The law requires people to disclose the complete address of the property and the actual selling price. The data set is thus comprehensive and accurate. Indeed, it contains detailed features of a property such as the number of rooms in the house, so the specification can be richer when constructing the hedonic model. This would solve the problem mentioned above of poor-quality data, and give a more precise measure of the effect.

By estimating the effect of expected accessibility instead of actual change in accessibility, this research would increase our understanding of the dynamic of housing prices in terms of changes in expectations. In fact, the proposed method in this research will explore the price change in 4 different stages of announcements, so that the change can be observed even more closely.

Furthermore, the study would add to our knowledge of the housing market in East Asian countries. The housing cultures are certainly different across regions. For example, in China and Taiwan, there is more owner-occupied housing than in the US. This piece of knowledge is important as we see transportation construction growing in East Asia.

Finally, the result of the study will benefit policy-making in Taiwan. Firstly, there are plans to extend the south part of THSR, and the experience this time in Yilan can serve as a lesson. Secondly, it is beneficial for future urban planning. The planned TSHR extension will make the connection between Taipei and Yilan tighter, so understanding the change in house prices in Yilan will help better urban policy for topics such as commuting.