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**Does Station Name Matter?:
Rent Seeking Behavior and Its Impact
on Housing Prices**

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Does Station Name Matter?: Rent Seeking Behavior and Its Impact on Housing Prices

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Abstract

The purpose of this study is to investigate the effect of rent-seeking behavior for public goods on housing prices. To do so, we analyzed the case of renaming the Sinchoeon station to Jamsilsaenae station for the Seoul Metro Green line by applying the rent seeking theory and estimated the effect of the event on the housing prices of the affected neighborhood. The hedonic pricing model adopted by related studies does not produce unbiased estimates due to the endogeneity resulted from omitted variables including compounding macroeconomic variables. By developing a new dataset, we used the difference in differences regression method that produces more precise and unbiased estimates. Our results show that the housing prices affected by the renaming event increased by around 5% compared to those of non-affected neighborhood. Our analytical results can shed light on understanding related rent seeking behaviors for public goods provision.

Key Words : rent seeking, supplying public goods, housing price, difference in difference

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I. Introduction

Korean society has recently experienced deepening economic inequality associated with real estate assets. Since income-centered inequality indices such as Gini coefficients cannot fully reflect the economic inequality of Korean society, it is important to consider earning and asset inequality resulting from ownership of real estate assets.

Since real estate is not only a means of residences but also investments, owners take various collective behaviors to raise prices. With its relatively small size and shared incentives of price increase, interest groups of real estate assets have higher cohesion than other interest groups. In particular, the interest groups of apartment owners use various strategies such as price targeting and demands for redevelopment and new public facilities, which can intensify social conflicts. In this regard, local conflicts over PIMFY (Please In My Front Yard) resources and rent-seeking behavior for the supply of public goods have been studied in various fields. However, in Korea, most studies have been conducted in the field of public administration rather than in economics, and economic empirical research analyzing the costs and benefits of the rent-seeking process is still insufficient.

The current study examined the behaviors of a local community within the framework of the rent-seeking theory of economics, using a case in 2017 when a Seoul subway station changed its name from Sincheon to Jamsil Saena, and performed a difference-in-differences analysis to identify the price increase of real estate assets related to the change of station name. Unlike the demand to attract public facilities, changing the name of a subway station can be understood as an act of rent-seeking in that it seeks to increase neighborhood housing prices without creating new values; the realization of price increases leads to a reversible redistribution of wealth.

The study has the two following implications: First, understanding that rent-seeking behavior in the public domain, such as a station name change, affects the increase or decrease of private property and can provide an example of a discrepancy between the beneficiaries and cost-bearers in terms of changes in the supply of public goods, as well as inform future relevant policies. Second, the discovery of new data empirically reveals the economic motives of rent-seeking behavior by addressing the issue of endogeneity that occurs when estimating asset price fluctuations. Most of the existing studies on house price fluctuations associated with the attraction of nearby facilities have adopted the traditional hedonic pricing model, which may have an endogeneity issue that overlooks relevant variables and macroeconomic conditions. On the other hand, this study conducted a difference-in-differences analysis that took the endogeneity issue into account and captured the effect of the station name change more accurately.

The structure of this paper is as follows: The next chapter reviews the theories and cases of rent-seeking behavior in changing the station name. Chapters III and IV discuss the empirical analysis methods and results,

and Chapter V presents the summary, implications, and limitations of the study.

II. The rent-seeking theories and cases

1. The Rent-seeking behavior for public goods and real estate assets

In the supply of public goods, the incentives for rent-seeking are often given by uncertainty about benefits and disparities in benefits versus cost burdens. In particular, if the scope of the general community that bears the cost of supplying public goods is large while the benefits are concentrated in a few individuals, they have strong incentives to have the public goods and may strategically attempt rent-seeking for the public goods. Moreover, if the benefits of supplying the public goods are difficult to be judged in the market due to external effects, subjectively assigned high values of the benefits may intensify rent-seeking behavior (Sakong, 2017; Jang & Yim, 2006; Ha, 2007). As such, rent-seeking incentives in the supply of the public goods lead to the formation of an interest group by individuals who directly benefit from the acquisition of the public goods. However, a large group size and the absence of sanctions or punishment for free-riding individuals make voluntary group actions difficult. In contrast, a small group size, the existence of punishment for free riding, and selective incentives for appropriate compensation for contribution facilitate the interest group to secure common interests without free riding. According to Olson (1968), such groups are called special interest groups or privileged groups, and they intervene in the political realm of the supply of public goods to maximize their interests through rent-seeking behavior such as lobbying. Understanding the imbalance of cost and benefit in the supply of public goods, they do not consider the loss of the general public in order to obtain the maximum benefit for them at the minimum cost. At the same time, the general public does not strongly oppose the rent-seeking behavior of these special interest groups. This is because the benefit of supplying public goods is concentrated in these few, whereas cost and loss are widely distributed to the general public, so the burden on individuals is very small. Therefore, considering the cost for the general public to sanction the rent-seeking behavior of the special interest groups, ‘rational ignorance’ is the reason why interest groups’ rent-seeking behavior for public goods occurs without much resistance (Olson, 1968).

A typical example of rent-seeking behavior occurring in the supply of public goods is competition between different regions to attract public services or facilities provided by the government (Katz, Nitzan and Rosenberg, 1990; Ursprung, 1990).³ Katz, Nitzan and Rosenberg(1990) analyzed the rent-seeking behavior

³ Studies define public facilities provided by the government as ‘pure’ public goods if they fully satisfy non-rivalry and non-excludability. These public goods are sometimes referred to as ‘local’ public goods if the consumption of residents of other regions is limited due to distance (Kim & Seo, 2017). This seems to be mixed in use to emphasize the characteristics of public

and derived the rent-seeking cost in the conflict between two regions to obtain the government-provided pollution remediation project rights. In general, it is assumed that the total cost of obtaining a rent is equal to the amount of benefits that can be obtained from rent-seeking. However, in rent-seeking for the supply of public goods, the cost assessed by an individual can be reduced by the possibility of free-riding (Katz, Nitzan and Rosenberg, 1990; Ursprung, 1990). Nevertheless, in fact, the rent-seeking cost that an individual bears within each group is affected by the group size, and when members have strong preferences for public goods and the size difference between competing groups is not large, this increases due to competition between groups (Cheikbossian, 2008; Debrezion et al, 2007; Riaz et al, 1995).

The economic benefits brought to a local community by the government's supply of public facilities and public goods include job creation through revitalization of the local economy, while the direct benefits of the rent-seeking group may be unclear. Yet, studies focus on the rise in real estate prices, such as land prices or housing prices, as the goal of rent-seeking behavior (Kim, 2003; Jang and Lim, 2006; Ha, 2007), even though these studies do not concern the consequential changes in real estate prices. Since changes in real estate prices are affected by multiple factors, including macroeconomic variables, it is not easy to estimate the effect of attracting public facilities alone. Thus, the beneficiaries of direct economic benefits, such as rising real estate prices, are likely to underestimate individual net benefits and try to pass on the cost of supplying public goods to the general public, not the direct beneficiaries. In this regard, it is necessary to investigate whether the economic incentives of the group that pursues to attract public goods are realized through the price increase of real estate assets.

Since the housing price as an investment asset is influenced by the surrounding environment, homeowners seek to increase the price by improving the environment, such as opposing the attraction of avoidable facilities and demanding preferred facilities and transportation infrastructure enhancement. In particular, since the dominant type of housing in South Korea is apartments, these attempts occur collectively rather than individually.⁴ Apartments in which a large group of people reside in a small area are characterized by

goods that meet non-exclusion and non-rivalry, and a club goods or natural monopoly goods that does not compete with but has limited exclusivity (Park, 2003; Yim & Jang, 2004).

⁴ Apartments are the dominant form of housing in South Korea.

<Table> 2015-2019 Housing Type

	2015	2016	2017	2018	2019
Single-family house	24%	24%	23%	22%	22%
Apartment	60%	60%	61%	61%	62%
Townhouse	3%	3%	3%	3%	3%
Multi-family house	12%	12%	12%	12%	12%
House in non-residential building	1%	1%	1%	1%	1%

Source: Statistics Korea, Housing census

their closedness and self-sufficiency. The living conditions of having spaces close to each other as well as frequent interactions also facilitate collectivism (Shin, 2000). Moreover, residents view the shared facilities in the apartment as a common property and pay the shared cost (Lim et al., 2003), and the rise in the apartment brand value affects all residents. Thus, it is easy for an apartment community to be an interest group, especially when the apartment built with efficient communication channels promotes the behavior of rent-seeking through learning and diffusion (Kang, 2010).

In addition to attracting preferred public facilities, which is costly and time-consuming, collective actions to increase apartment prices include putting the apartment name as a bus stop name or putting a desirable neighborhood name as a apartment name. The pursuit of profit of the apartment community increases the cohesion of its members based on the common incentive of rising house prices. The small group size limited to a apartment community and the relative benefits of a house price increase compared to the costs of group action induce active participation of its members. This apartment community interest group aligns with Olson's concept of a special interest group, and the collective actions of such an apartment interest group for attracting public facilities provided by the government correspond to rent-seeking behavior for public goods; Their small-scale cohesive behavior is rarely recognized or deterred by the general public bearing the eventual costs, which results in rational ignorance.

2. The Analysis of rent-seeking behaviors on conflicts over attracting preferred public facilities

As a part of local conflicts or the PIMFY phenomenon, the rent-seeking behavior for attracting preferred public facilities has received attention from many researchers in South Korea (see Table 1 for a summary).

Unlike most of these studies shedding light on the conflict pattern, Kim (2003), Jang & Yim (2006), and Ha (2007) linked the conflicts and rent-seeking behavior. However, their studies did not include empirical evidence on the size of rent or rent-seeking costs associated with the attraction of preferred facilities.

Some studies empirically analyzed whether the attraction of preferred facilities affected neighboring house prices (see Table 1 for a summary). They analyzed land price and house price increases by introducing hedonic pricing models, which are traditional asset pricing models, or simple regression analyses. However, as mentioned above, uncontrolled environmental factors and macroeconomic changes may lead to the biased estimator due to endogeneity of the model, which fails to accurately identify the effect on real estate price rise.⁵ In this regard, confirming the connection between theory and empirical evidence and overcoming

⁵ Exceptionally, Wen, Xiao and Zhang (2017) analyzed the relationship between school districts and house prices using the difference-in-differences method to address endogeneity in regression analysis. However, despite their estimates of the effect of school districts on housing prices, the study did not provide a direct analysis of the rent-seeking behavior.

existing methodological limitations requires a new methodology for preferred facility attraction and interpretation from a rent-seeking perspective.

Table 1. Studies on Preferred Public Facilities

Study	Facility	Analysis Focus
Go (2003)	Jeonbuk Public Foreign Language High School	intra-governmental conflict over attracting a preferred facility
Kim (2003)	Provincial government building	rent-seeking behavior on attracting a preferred facility
Park (2003)	-	external effects of public facilities and conflict over location
Kim (2004)	Gyeongbu high-speed rail and Ulsan train station	comparison of NIMBY and PIMFY facility location policy conflict structure
Jang & Yim (2006)	Gyeongbu high-speed rail (station name)	rent-seeking behavior and PIMFY conflict among local governments
Ha (2007)	Korea Electric Power Corporation	competition to attract a preferred facility from the rent-seeking perspective
Yim (2011)	Metropolitan area railway (station name)	conflict management over public facility name

Table 2. Empirical Analysis Studies on Preferred Public Facilities

Study	Facility	Effect	Analysis Method
Bajic(1983)	New Subway Line in Metropolitan Toronto	+	Hedonic pricing model
Debrezion, Pels and Rietveld(2011)	Rail Transport in Dutch	+	Hedonic pricing model
Feng and Lu(2013)	School quality in Shanghai, China	+	Hedonic pricing model
Jung & Jeong (2015)	High-speed rail transfer center	△	Linear Regression and Price Change Comparison
Wen, Xiao and Zhang(2017)	School district, education quality	+	DID(zero school policy)
Yuan, Wei and Wu(2020)	Amenity effects (accessibility, scarcity, and urban spaces)	+	Hedonic pricing model

3. Station Name Change and Rent-seeking Behavior

A station name can represent the image of the neighborhood and revitalize the surrounding commercial districts and house prices. In addition, once a station name is attached, it has the characteristics of a public good with non-exclusion and non-rivalry, but at the same time, a certain neighborhood may enjoy greater benefits from the station name. Such differential benefits can cause conflicts between regions when deciding on a station name, as shown in the conflict between Cheonan City and Asan City for a station name of Gyeongbu High Speed Railway in the early 2000s. The dispute over the name of the Cheonan-Asan Station was interpreted as a conflict over the attraction of preferred facilities or PIMFY resources (Bae, 2020; Yim, 2011), and analyzed as the rent-seeking behavior (Jang and Yim, 2006).

Since it is difficult to empirically calculate the profits that a station name brings to a region, its value is mainly grounded on the subjective evaluation of local residents, which develops into the rent-seeking behavior of an interest group in neighboring apartments. In particular, since the cost and time involved in changing a station name are smaller than attracting public facilities, the judgment that the net value of the rent is large serves as a motive for the formation of the rent-seeking interest group.

The economic benefits associated with station names are as follows. First, adding a local name to the name of transportation or urban facilities can advertise the local area, as shown in the Cheonan-Asan Station name dispute. As the subway station name principle indicates that a subway station name may use the name of a local university, several universities in a same neighborhood have engaged in groundless requests or disputes for station names. For example, Chongshin University claimed its university name for Isu Station on Line 4, which is more distant, instead of Namseong Station, which is geographically closer⁶.

Second, it is possible for a local community to promote its economic benefits by adding desirable neighborhood names to surrounding transportation and urban facilities. This is particularly noticeable in the Gangnam area, Seoul, and Dogok-dong, the wealthiest part of Gangnam with high-end residential and commercial complexes. For the brand value of the name Dogok, nearby apartments located in Yeoksam are putting Dogok in their apartment name. Similarly, the process of changing the name of Sincheon Station to Jamsil Saenae Station in 2016 revealed the rent-seeking behavior of residents who wanted to acquire the brand value of the name Jamsil.⁷

⁶ Because of frequent disputes, the Seoul government has implemented a bidding notice for subway station names since 2017 and sold station names to public institutions, schools, hospitals and department stores within 500 meters of the station. The government also promised to organize a deliberation committee to maintain the publicity of station names while supplying them as a reliable means of publicity (Seoul Metropolitan City, 2017).

⁷ The second aspect is similar to a hidden rent, so it has not involved visible social conflicts or competitions between regions. In particular, emphasizing the validity and publicness of changing a station name based on the surrounding area name can avoid

Examining the Jamsil Saena Station name change on Seoul Subway Line 2, this study analyzed whether the name change affected neighboring apartment prices. Because of the possible conflicts between the groups that benefit and lose from the change, changing a station name is more complicated than establishing a new station name. The beneficiary groups can underestimate costs and pass them on to the general public by inflating public interests rather than direct individual interests, and knowing that changing the station name brings significant benefits and strengthens the rent-seeking behavior. Communities that witnessed the rise in the price of neighboring apartments after a station name change or learned the cost-benefit distribution structure of a station name change can continue the systematic rent-seeking behavior allied with local politicians. In this process, they can apply the profit maximization strategy that they have learned from the rent-seeking behavior, monopolize information, and intentionally exclude interested parties such as rent evaluators or rent loss users. Therefore, analyzing the rent-seeking behavior for a station name change reveals its direct beneficiaries and elucidates the gap in social costs that are hidden or reduced in the name of the public interests. In addition, it can reduce the costs passed on to the general public by specifying the compensations and loss groups of the station name change. Furthermore, the analysis can inform policies to reduce social costs associated with rent-seeking behavior by promoting a more in-depth understanding of its social benefits and costs.

Table 3. Changed station names in Songpa-gu, Seoul

Former name	Changed name	Change status	Year	Reason for Change
Seongnae	Jamsil Naru	Completed	2010	Confusions with Seongnae dong in Gangdong gu or Songnae Station
Sincheon	Jamsil Saena	Completed	2017	Administrative affiliation with Jamsil-dong, confusion with Sinchon Station
Jangji	Garden Five	Requested	Ongoing	Same pronounce with grave in Korean, revitalization of the neighboring Garden Five commercial district
Munjeong	Munjeong Rodeo	Requested	Ongoing	Revitalization of the neighboring Munjeong Rodeo commercial district
Bokjeong	Wirye	Requested	Ongoing	Relevance to the neighboring Wirye new town

criticism from the many who bear the costs. Also, because the benefiting group is a small number of individuals and only share the benefit information among them, the costs of competition are lower than in the first aspect. This characteristic suggests that a small number of local or apartment communities that recognize common interests can participate in the active rent-seeking behavior. However, changing an already established name can incur social costs.

4. The rent-seeking behavior in the name change process of Jamsil Saena Station

This section described the process of changing the station name from Sincheon Station to Jamsil Saena Station on Seoul Subway Line 2, which was decided in 2017, and analyzed the relevant rent-seeking behavior. Table 3 lists the changed station names in Songpa-gu, Seoul.

Table 4. Jamsil Naru and Jamsil Saena Station Name Change Details

	Seongnae->Jamsil Naru	Sincheon->Jamsil Saena
Reason for Change	<ol style="list-style-type: none"> 1. Administrative confusion (confused with Seongnae-dong, Gangdong-gu) 2. Similar station name (confused with the Songnae Station, Bucheon, Gyeonggi-do) 	<ol style="list-style-type: none"> 1. Administrative confusion (administratively assigned to Jamsil-dong, not Sincheon-dong) 2. Similar station name (confused with Sinchon Station, Mapo-gu)
Survey participants	A total of 18,944 participants, including Jamsil and Pungnap-dong residents and subway users around the Seongnae Station	A total of 1,081 participants including approximately 300 residents of Jamsil Bondong, LLLs, Ricentz, Trizium Apartments
Survey Results	Agreeing to the name change 86.4% -Jamsil Naru 75.3% -Songpa Naru 14% -East Jamsil 5.1% -Hanseong Baekje 2.3%	Agreeing to the name change 88% -Jamsil Saena 44% -Jamsil Town 36% -New Jamsil 18% -Other 2%
Cost-bearer	Seoul Metro (the management authority of the station)	Seoul Metro (the management authority of the station)

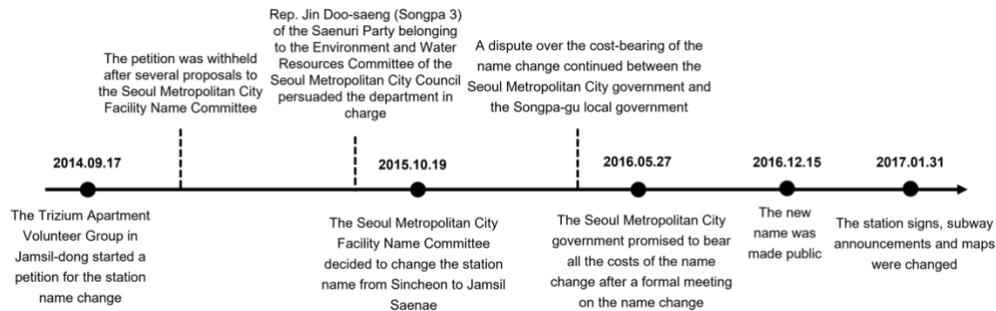
Table 4 shows the similarity of the reasons for the station name change between Jamsil Naru and Jamsil Saena. However, while the former survey had 18,944 participants, including Jamsil and Pungnap-dong residents and subway users around the Seongnae Station, the latter survey had only 1,081 participants including approximately 300 residents of Jamsil Bondong, LLLs, Ricentz, Trizium Apartments near Sincheon Station. Despite criticisms of the reasons for the name change⁸, the change procedure learned in the 2010 Jamsil Naru Station name change process was applied to the Jamsil Saena Station name change.

The process of the Jamsil Saena Station name change started with a petition from the Trizium Apartment Volunteer Group (Figure 1). The volunteer group was the first apartment residents' volunteer group registered with the Seoul Volunteer Center in 2009. Since such apartment communities have strong cohesion with the

⁸ The argument of the confusion of administrative districts was not fully justified, because many buildings near the station belonged to Jamsil-dong administratively and Sincheon-dong legally, and schools around Jamsil-dong also use both Sincheon and Jamsil names. Likewise, in terms of the confusion between the similar names, one could argue that another station name including Jamsil might make the confusion even worse. More importantly, there was pressure that a new name must include 'Jamsil', the wealthiest neighborhood near the station (Lee, 2015).

common interest of rising apartment prices and are smaller than local communities, they match the characteristics of Olson's special interest groups discussed above. Afterwards, The Trizium Apartment Volunteer Group formed the Residents' Committee for the Shincheon Station Name Change and became the basis for developing into rent-seekers.

Figure 1. Process of the Jamsil Saenaek Station Name Change



Moreover, the constituency councilor and the head of Songpa-gu accepted this petition, presented it as a next election promise, and visited the Seoul Metropolitan City department in charge to push the petition forward, which was an assertive advocate for the apartment community's rent-seeking behavior. Later, after a long dispute, the proactive interventions of local politicians led to the Seoul government paying the entire costs of changing the station name, which was originally supposed to be Songpa-gu's burden.⁹

The social costs of a station name change includes, in addition to the direct cost, the inconvenience of station users and those involved in the surrounding commercial district. For example, the district around Sincheon Station has long been recognized as an entertainment-focused commercial district, however, complaints have been raised that sales of entertainment outlets declined as the district became associated with the residential neighborhood of Jamsil (Kim, 2017). The size of the social costs can be even greater considering the negative macroeconomic effects of a rise in real estate prices simply due to speculative demand, rather than an increase in added value such as actual facility improvement, and the reverse redistribution of wealth.

In the process of the station name change, the relatively small size of the real estate interest group and the larger expected profit of house price increase compared to the cost of collective action enabled active participation of members. In the meanwhile, there was no civic group capable of monitoring and sanctioning the rent-seeking behavior of the interest group, because the cost was dispersed due to the large size of the social group bearing the cost.

⁹ After the dispute, in 2015, the Seoul subway station name system and standards were revised to specify that the direct and indirect costs of the station name change are borne by the contributor (the requesting entity).

III. Methods

1. Data and Variables

1) Data

In order to examine whether house prices increased after the station name change in 2017, this study selected regions that were affected and not affected by the station name change. The affected region included Jamsil Saena Station and the nearby two stations (Jamsil Station, Jamsil Naru Station), and the non-affected region consisted of the five neighborhoods of Bangi-dong, Samjeon-dong, Seokchon-dong, Songpa-dong, and Pungnap-dong, and its 155 apartment buildings (15 in Jamsil-dong, 16 in Sincheon-dong, 45 in Bangi-dong, 9 in Samjeon-dong, 17 in Seokchon-dong, 28 in Songpa-dong, and 25 in Pungnap-dong). The apartment price data was drawn from the Transaction Price Disclosure System of the Ministry of Land, Infrastructure and Transport¹⁰, with the two time points of 2015 and 2017. Unlike the market price, the transaction price indicates the price directly reported by the person bound in duty to give the notification. Thus, some apartment prices may have been reported lower than the market price due to the dodge-reports (Kwon, 2020). However, even if the dodge-report price is lower than the actual transaction price, the existence of a significant difference can mean a larger price increase.

2) Variables

Housing and location characteristics were drawn from data from Naver Real Estate, Real Estate Bank, and Hogaengnono Apartments. The analysis variables are as follows.

Table 5 is a list of variables of apartment prices (see Lee & Choi, 2016; Hwang & Jeong, 2020 for the selection of the variables). Since there were differences in housing characteristics such as number of rooms, number of bathrooms, and structure by each apartment size, individual values were set for each apartment size instead of an average. First, a hedonic pricing analysis was conducted. Viennaville and Wonnam in Seokchon-dong and Samyong in Pungnap-dong and Gaobillat in Songpa-dong were excluded because of missing values in the main variables, which resulted in 481 samples out of 155 apartment buildings. Among them, 398 samples transacted in 2017 after the station name change were analyzed. Detailed basic statistics are presented in the appendix.

¹⁰ Data of the Transaction Price Disclosure System has been collected since January 2006 in accordance with the Real Estate Transaction Reporting Regulation. This includes the prices of houses (apartments, townhouses/multi-family houses, single-family houses), office studios, lands, commercial and business real estates, and apartment sale/occupancy rights concluded after June 29, 2007.

Table 5. Analysis Variables

	Variable Names	Unit	Description
Price	Transaction price/ m^2 (Price)	10,000 Korean Won	Transaction price divided by the dwelling exclusive area
Location	Station Name Change (Name)	-	Status of station name change Not changed=0, changed=1
	Neighborhood	-	Samjeon-dong=1, Pungnap-dong=2 Songpa-dong=3, Seokchon-dong=4, Bangi-dong=5, Sincheon-dong=6, Jamsil-dong=7, in order of the average transaction price
	Distance from a subway station	m	Distance between the sample and the closest subway station
	Distance from an elementary school	m	Distance between the sample and the closest elementary school gate
	Distance from a middle school	m	Distance between the sample and the closest middle school gate
	Distance from a high school	m	Distance between the sample and the closest high school gate
Housing	Size	m^2	Supply area subtracted by common area
	Number of rooms		Number of rooms of the house
	Number of bathrooms		Number of bathrooms of the house
	Parking slot		Average number of parking slot per household
	Age of the house	Year	Age of the house
	Number of apartment households		Number of apartment households
	The highest floor		The highest floor
	Floor		The floor of the sample
Time Point	Heating	-	Separate heating=0, central/local heating=1
	Transaction Year (Year)	-	2015=0, 2017=1
	Transaction Month	-	From January to December

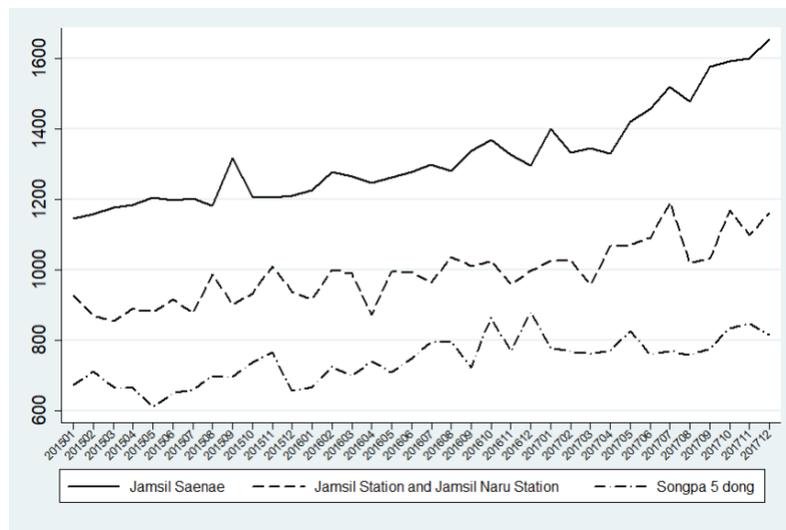
The region around Jamsil Saena Station, which had been expected to be affected by the station name change, included apartments up to a radius of 700m of the station considering a 10-minute walking-distance to the station, in addition to a radius of 500m of the station considering the definition of a station area.

The region included Jamsil Els, Trizium, Ricentz, Hanyoung Haesian, Jugong 5, Galleria Palace, Lake

Palace, a total of 7 complexes¹¹. Since there were many apartment buildings between Jamsil Station and Jamsil Naru Station, they were set up as a group for comparison with Jamsil Saena Station rather than separating the two stations. However, considering the possibility that the change of the station name to Jamsil Saena could have affected Jamsil Station and Jamsil Naru Station in accordance with the completion of the two nearby stations, Jamsil Saena Station and the two stations were used as a comparison group. Comparisons were also made with the remaining five neighborhoods (Bangi-dong, Samjeon-dong, Seokchon-dong, Songpa-dong, and Pungnap-dong) without the Jamsil Saena Station region and the two nearby stations.

Figure 2 shows that the average price of apartments in the five neighborhoods near Jamsil Saena Station, and Jamsil Station and Jamsil Naru Station set as a comparison region has changed since 2017 after the station name change. The change in apartment prices after the station name change was also revealed in the average price change trend of neighboring apartments.

Figure 2. Price of the comparison region per $1m^2$



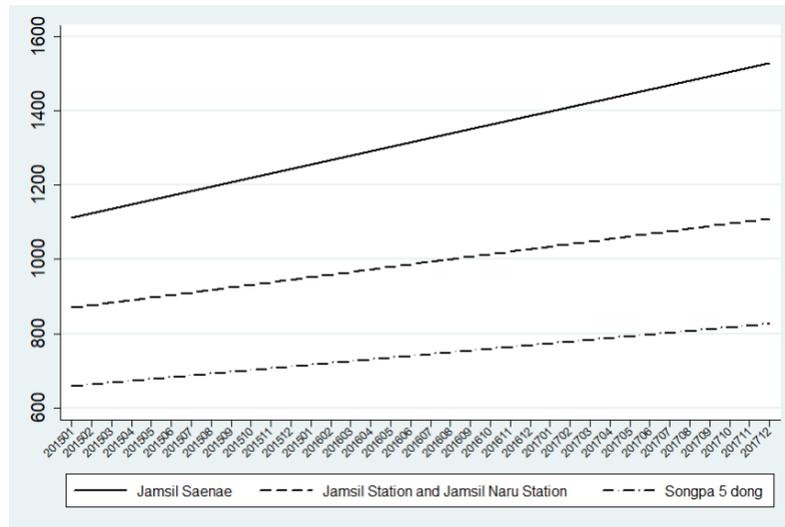
Unit: 10,000 Korean Won

As shown in the representative regression line of the transaction price per $1m^2$ between the regions (Figure 3), the prices in the Jamsil Saena Station region sharply increased after the decision of the station name change compared to the prices of the Jamsil Station and Jamsil Naru Station region and the Songpa 5

¹¹ Although Jugong 5, Galleria Palace, and Lake Palace located between Jamsil Saena Station and Jamsil Station belonged to the shared station area, they were included in the Jamsil Saena Station region because they would have been affected by the station name change. Exclusion of these three complexes did not significantly change the results.

dong.

Figure 3. Price regression line of the comparison regions per $1m^2$



Unit: 10,000 Korean Won

In terms of the price difference between 2015 and 2017 at the Jamsil Saenaе Station region, the two nearby station regions, and the Songpa 5 dong, the average and transaction price per $1m^2$ rose in 2017 than 2015. This was because apartments with a large size were transacted in 2017 compared to 2015, which indicated that the demand for larger apartments in Songpa-gu has grown in the past two years. Although the regions of Jamsil Saenaе Station and its nearby two stations overlapped each other, the overall transaction price by size in Jamsil Saenaе was higher compared. In particular, the difference between Jamsil Saenaе Station and the five neighborhoods was more striking; expensive apartments seemed to be clustered around Jamsil Saenaе Station. Therefore, hedonic pricing analysis and difference-in-differences analysis that properly controlled these characteristics were needed.

2. Analysis

1) Hedonic Pricing Model

The hedonic pricing model evaluates intangible values by converting them into economic values and is a traditional and popular housing pricing analysis technique especially in real estate research. This is a functional formula that estimates the price by assuming a correlation between the housing price and the preference for the intrinsic value of the house and regressing the housing price to the housing characteristics (Lee & Choi, 2016). Using a linear function of the hedonic functions, this study set the following functional expression:

$$Aprice_i = \beta_0 + \beta_1 Name_i + \alpha X_i + \varepsilon_i \dots\dots\dots (1)$$

In the equation, $Aprice_i$ is the average transaction price per $1m^2$ of each apartment in 2017¹². $Name_i$ is a dummy variable that assigns an apartment in the affected region of the station name change 1, otherwise 0. X_i indicates housing, location, and time point factors on an apartment price.¹³ Table 6 presents the three hedonic pricing models used in the analysis.

2) Difference-in-differences analysis

The hedonic pricing model primarily shows the influence of station name change among comparison groups. However, it fails to control the omitted variables between the comparison groups and various macroeconomic effects such as policies or inflation. Therefore, this study used the difference-in-differences analysis to address such limitations in examining the effect of the station name change on apartment prices in 2017.

The difference-in-differences method estimates the impacts of a specific policy or event by using the difference between the treatment group and control group, mainly using panel data consisting of two groups and two time points of pre- and post-implementation. One thing to note is that the study data, the Transaction Price Disclosure System, does not technically have a panel data structure because the price information is reported to the system only when real estate transactions are made. Still, the difference-in-differences method is applicable for this study in that it captures the gap between time points and groups (Kang et al, 2013; Choo, 2018; Hwang & Park, 2015).

Table 6. The hedonic pricing model

Number	Hedonic Model 1	Hedonic Model 2	Hedonic Model 2
Name=1	Jamsil Saena Station	Jamsil Saena Station	Jamsil Saena Station and the nearby two stations
Name=0	Jamsil Station and Jamsil Naru Station	Songpa 5 dong	Songpa 5 dong

¹² Because the hedonic model used the average price for each apartment size in 2017, and the difference-in-differences analysis used the transaction prices in 2015 and 2017 as they were, the observation of the hedonic model was smaller.

¹³ See Table 5 for analysis variables

In this study, the region of Jamsil Saena Station and the nearby two stations was set as the treatment group, and the Songpa 5 dong were set as the control group (Table 7). Since the station name was publicized on December 15, 2016, and the station name change was completed on January 31, 2017, 2015 was set as the pre-treatment time point and 2017 as the post-treatment time point.

As the housing price at the time point of t at the Songpa-gu region i was set as P_t^i , $i = 0$ indicated the non-affected region of the station name change, that is, Jamsil Station, Jamsil Naru Station, and the Songpa 5 dong. $i = 1$ indicated the affected region of the station name change, that is, Jamsil Saena Station and its nearby 2 stations. On the other hand, $t = 0$ indicated Year 2015, before the name change of Jamsil Saena Station was discussed, and $t = 1$ indicated Year 2017, when the name change of Jamsil Saena Station was completed. Then, $P_1^1 - P_0^1$ indicated the change in the apartment prices near Jamsil Saena Station or Jamsil Saena Station and two nearby stations after the station name change, and $P_1^1 - P_1^0$ indicated the price difference between the treatment and control groups in 2017 after the station name change. Nevertheless, $P_1^1 - P_0^1$ could have been affected by the macroeconomics factors changed between 2015 and 2017, and $P_1^1 - P_1^0$ could have been affected by the housing and location characteristics of the two regions. In this regard, the difference-in-differences analysis eliminated these point-in-time and regional impacts in the following manner.

$$(P_1^1 - P_0^1) - (P_1^0 - P_0^0) = (P_1^1 - P_1^0) - (P_0^1 - P_0^0) \dots \dots \dots (2)$$

The regression equation of the analysis is as follows.

$$\ln Price_{it} = \beta_0 + \beta_1 Name_i + \delta_0 Year_t + \delta_1 (Name_i * Year_t) + \alpha X_{it} + \varepsilon_{it} \dots \dots \dots (3)$$

In the formula, $\ln Price_{it}$ was the logarithm of the transaction price per $1m^2$ of apartments traded in 2015 and 2017. $Name_i$ was a dummy variable that indicated the affected region of the station name change=1, non-affected region=0. $Year_t$ was a dummy variable that indicated the pre-treatment time point of 2015=0, the post-treatment time point of 2017=1. X_{it} indicated apartment characteristics (e.g., housing, location, time-point) that affected apartment prices at each point in time, which was controlled to estimate the exact effect of the station name change. The hedonic pricing model confirmed the need for the control variables. Here, in order to confirm the change in apartment price due to the station name change, δ_1 , the coefficient of $Name_i * Year_t$, was confirmed. $Name_i$ was a variable on the effect of the station name change in the hedonic pricing model, whereas it was a variable on the status of the station name change in the difference-in-differences model. Since the same regional comparison as the hedonic model was required, there were three difference-in-differences analysis models.

Table 7. The difference-in-differences analysis models

Number	DID Model 1	DID Model 2	DID Model 2
Name=1	Jamsil Saena Station	Jamsil Saena Station	Jamsil Saena Station and the nearby two stations
Name=0	Jamsil Station and Jamsil Naru Station	Songpa 5 dong	Songpa 5 dong

IV. Results

1. Results from the hedonic pricing analysis

A hedonic pricing model identified whether the station name change affected the apartment prices. Table 8 shows the differences in average values for each apartment per size in each region in 2017.

Table 8. Results from the hedonic pricing analysis

	Hedonic Model 1	Hedonic Model 2	Hedonic Model 2
Station Name Change (Name)	213.2** (68.89)	167.2** (60.65)	191.0*** (40.11)
Size	-0.242 (0.892)	-3.096*** (0.555)	-2.204*** (0.513)
Number of rooms	-130.4** (43.31)	25.87 (22.68)	-14.73 (20.96)
Number of bathrooms	16.51 (55.05)	-51.98 (28.16)	-13.40 (28.44)
Parking slot	99.74 (56.84)	61.81* (28.19)	6.069 (20.35)
Age of the house	6.196 (3.402)	-1.405 (1.694)	0.617 (1.569)
Number of apartment households	0.0816*** (0.0140)	0.109*** (0.00877)	0.0825*** (0.00766)
The highest floor	-11.45** (3.598)	2.769 (1.863)	-0.620 (1.764)
Floor	4.763* (2.202)	3.247 (1.873)	2.937 (1.677)
Heating	305.2** (93.34)	103.0*** (30.21)	180.0*** (28.39)
Neighborhood	-62.80 (51.25)	20.98* (9.090)	31.93*** (8.458)
Distance from a subway station	0.303 (0.163)	0.0460 (0.0633)	0.0458 (0.0626)
Distance from an elementary school	-0.249 (0.209)	0.106 (0.0582)	0.0466 (0.0577)

Distance from a middle school	-0.352** (0.126)	0.0493 (0.0620)	-0.0138 (0.0532)
Distance from a high school	-0.204 (0.211)	0.0416 (0.0566)	0.122* (0.0488)
Transaction Month	3.974 (7.598)	-1.311 (3.472)	-2.326 (3.470)
Constant	1718.7*** (400.3)	642.3*** (76.03)	666.1*** (76.74)
Adj R^2	0.7754	0.7808	0.7530
Observations	105	292	356

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The p-value of the variable Name showed that the name change to Jamsil Saena Station in 2017 was significantly associated with apartment prices. The difference in apartment prices near Jamsil Saena Station, Jamsil Station, and Jamsil Naru was 2.13 million won per $1m^2$, 1.67 million won per $1m^2$ near Jamsil Saena Station and the Songpa 5 dong, and 1.91 million won per $1m^2$ near Jamsil Saena Station, its two nearby stations, and the Songpa 5 dong. Given that the average apartment size in Songpa-gu was $87m^2$, a difference of 150 to 190 million won was found for each comparison region in relation to the station name change. However, the possibility of omitted variables or endogeneity warranted careful attention to the interpretations of these results.

The results of other control variables were consistent with those of previous similar studies. The housing characteristic variables that had a significant effect on apartment prices near Jamsil Saena Station and the two nearby stations included size, number of households, and heating. In particular, the number of households and central/local heating were positively associated with an increase in apartment prices. Also, size was negatively associated with the price per m^2 , because newly built apartments near Jamsil Saena Station with relatively high prices mainly had small sizes. The positive association between the number of households and apartment prices implied greater demand for large apartment complexes. The positive association between central/local heating and apartment prices seemed to be attributed to the fact that large apartment complexes tended to have central/local heating and enable heating cost savings. On the other hand, the association between the distance from a station/school and apartment prices was different for each model and was not statistically significant.

2. Results from the difference-in-differences analysis

In order to identify the effect of the station name change on the apartment prices based on the difference-in-differences analysis, the coefficient value of $Name_i * Year_t$ in the analysis model should be confirmed.

Table 9. Results from the difference-in-differences analysis

	DID Model 1	DID Model 2	DID Model 2
Station Name Change (Name*Year)	0.0406*** (0.00752)	0.0464*** (0.00731)	0.0407*** (0.00691)
Changing Region (Name)	0.161*** (0.0103)	0.164*** (0.0107)	0.0963*** (0.00766)
Changing Year (Year)	0.170*** (0.00549)	0.179*** (0.00536)	0.177*** (0.00558)
Size	-0.00328*** (0.000146)	-0.00433*** (0.000134)	-0.00354*** (0.000120)
Number of rooms	0.0163** (0.00568)	0.0442*** (0.00527)	0.0136** (0.00481)
Number of bathrooms	-0.0574*** (0.00667)	-0.0575*** (0.00634)	-0.0521*** (0.00575)
Parking slot	0.0201* (0.00878)	-0.0164* (0.00682)	0.0258*** (0.00601)
Age of the house	0.0104*** (0.000486)	0.00356*** (0.000401)	0.00721*** (0.000396)
Number of apartment households	0.0000659*** (0.00000172)	0.0000645*** (0.00000164)	0.0000447*** (0.00000125)
The highest floor	0.00269*** (0.000569)	0.00178*** (0.000500)	0.00302*** (0.000493)
Floor	0.00240*** (0.000291)	0.00250*** (0.000272)	0.00199*** (0.000241)
Heating	-0.0146 (0.00859)	0.0937*** (0.00698)	0.0330*** (0.00779)
Neighborhood	0.0663*** (0.00179)	0.0630*** (0.00228)	0.0880*** (0.00160)
Distance from a subway station	-0.000101*** (0.0000183)	0.0000950*** (0.0000144)	0.000100*** (0.0000144)
Distance from an elementary school	-0.000159*** (0.0000196)	0.0000824*** (0.0000142)	-0.000207*** (0.0000166)
Distance from a middle school	0.000204*** (0.0000158)	0.0000645*** (0.0000131)	-0.0000314** (0.0000116)
Distance from a high school	-0.0000195 (0.0000151)	0.000110*** (0.0000146)	0.0000307* (0.0000124)
Transaction Month	0.0136*** (0.000590)	0.0145*** (0.000555)	0.0135*** (0.000523)
Constant	6.151*** (0.0216)	6.121*** (0.0188)	6.151*** (0.0190)
Adj R^2	0.8838	0.8935	0.8522
Observations	5318	5480	7107

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The results of Name*Year variable showed significant price differences near Jamsil Saenae Station, Jamsil

Station, and Jamsil Naru Station in Model 1, Jamsil Saena Station and Songpa 5 dong in Model 2, and Jamsil Saena Station and its nearby two stations and Songpa 5 dong in Model 3. In Table 10, Jamsil Saena Station, Jamsil Station, and Jamsil Naru Station had the price difference of 4.1%, Jamsil Saena Station and the Songpa 5 dong 4.6%, and Jamsil Saena Station and its nearby two stations and the Songpa 5 dong 4.1%. The average price of an apartment in Songpa-gu varied from 44 million to 50 million won. Although the failure to control for regional differences in Jamsil Saena Station, Jamsil Station, and Jamsil Naru Station, and Jamsil Saena Station and the Songpa 5 dong In the Hedonic pricing model further widened the price differences of Jamsil Saena Station, Jamsil Station, and Jamsil Naru station, the difference-in-differences analysis that addressed the endogeneity issue confirmed that the effect of the station name change varied by the distance to the station¹⁴. In the other words, the effect of the station name change seemed to be significant in increasing apartment prices near not only Jamsil Saena Station but also the two nearby stations. Furthermore, considering the possible underestimation due to dodge-reports on the Transaction Price Disclosure System, the actual price difference between regions may have been larger. Also, although there are differences in the effect of housing and location characteristics on apartment prices by region of comparison, this generally seemed to reflect the characteristics of apartments in Songpa-gu at the time of price analysis.

Because of the different effect on the price increase of apartments near Jamsil Saena Station despite the close distance between Jamsil Saena Station, Jamsil Station, and Jamsil Naru Station, it was predicted that the rent-seeking behavior of the station name change may continue to occur between adjacent areas in the future. Currently, Songpa-gu is engaged in a conflict with neighboring Seongnam City in Gyeonggi-do over the name change of Bokjeong Station; Regarding the names of additional stations on Seoul Subway Line 8 to be newly established in Wirye New Town, which was built across three local governments of Seoul Songpa-gu, Gyeonggi Seongnam, and Gyeonggi Hanam, the Seongnam local government is claiming the station name of Wirye Station, while Songpa-gu is arguing for the replacement of the station name from Bokjeong Station to Wirye Station (Han, 2021).

V. Conclusion

The purpose of this study was to understand an interest group's rent-seeking behavior to raise the real estate asset in terms of the supply of public goods, and to identify whether the attraction of a public facility was associated with an increase in the asset prices. For this purpose, the study used the case of station name change of Jamsil Saena Station on Seoul Subway Line 2 in 2017. As a result, it was found that the station name change had an impact on the apartment prices near Jamsil Saena Station and its two nearby stations.

¹⁴ For other control variables, unlike in the hedonic pricing model, the statistical significance or the direction of the effect on the prices was consistent. Even though a few variables had different directions depending on the model, the magnitude of the coefficients hardly differed from 0.

The apartment owners near Jamsil Saena Station, who realized an increase in apartment prices by changing the station name, repeated the profit increase mechanism learned from the station name change from Seongnae Station to Jamsil Naru Station in the past. This means that other areas or apartment communities may also learn the rent-seeking behavior and become interest groups using the case of Jamsil Saena Station, and intensify social conflicts over the supply of similar public goods in the future. As the rent-seekers monopolized information and limited the scope of stakeholders in the survey during the Jamsil Saena Station name change process, the stores of the commercial district around Sincheon Station as rent evaluators or rental losers, Seoul citizens who had to bear the cost, and Station users did not sanction the rent-seeking behavior.

As conflicts between local governments over the station name change continued, the Seoul Metropolitan Government announced the *Plan for the Improvement of Standards and Procedures for Establishment and Revision of Station Names for Urban Railways* in 2015. It specified that the cost of the name change should be levied on the contributor (the requesting entity), the subject of the burden should be confirmed in advance, the request for revision should be elaborated in the official document, and the number of repetitions should be limited to one. The plan intended to control the cost-benefit disparity and sanction the rent-seeking behavior for station name change. In addition, the requesting local government needs to collect the opinions of residents within a 500m radius of the station, and the transportation policy department needs to listen to the opinions of other stakeholders when necessary. However, as demonstrated in the case of the name change of Jamsil Saena Station, the ambiguous legal basis or scope of stakeholders may still allow the rent-seekers to reduce the scope of stakeholders and monopolize information.

Analyzing the rent-seeking behavior of the station name change can help identify the direct beneficiaries of the change and more accurately understand the problem of disproportionate social costs that are hidden or reduced under the name of public interests. Moreover, this can reduce the cost passed on to the general public by identifying the entity responsible for compensation for the inconvenience of the station name change. Therefore, this analysis, which promotes an in-depth understanding of social benefits and costs associated with the name change, can contribute to policies to reduce social costs caused by rent-seeking behavior.

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