To Move or Not to Move? The Impact of Immigration Influx on Natives' Neighborhood Choices in Seoul, Korea

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We investigate the impact of an increase in immigrant inflows on natives' residential choices in a large metropolitan city. We utilize an administrative dataset containing information about residential address changes and self-reported reasons for relocation. Exploiting the expansion of a special visa program as an exogenous shock, we find that immigration inflows are both a push and a pull factor for natives. While neighborhoods in Seoul lost more than 6 natives for every 10 additional immigrants between 2006 and 2015, certain native workers were drawn to areas with immigrant inflows for job-related reasons.

Keywords: *Immigration, Native Flight, South Korea*

JEL: J15, J61, O15, R23

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I. Introduction

Immigration has a significant impact on host countries. The inflow of immigrant workers influences natives' labor market outcomes such as wages and employment (Borjas, 2003; Card, 2009; Ottaviano and Peri, 2012; Dustmann et al., 2016). In addition, the segregation of immigrant communities may negatively affect future labor market outcomes regarding immigrants' children or may cause a low degree of assimilation (Cutler et al., 2008; Chetty et al., 2014; Danzer and Yaman, 2013).

There is already a substantial body of literature regarding the question of whether an inflow of immigrants triggers increased segregation between immigrants and natives or causes the "flight" of the native population. Most studies have found that growing immigrant density leads to the out-migration of natives (e.g., Betts and Fairlie, 2003; Saiz and Wachter, 2011; Cascio and Lewis, 2012; Alden et al., 2015). In other words, natives perceive immigrant communities to be less desirable places to live and, accordingly, leave these neighborhoods.[1] However, the question of which factors tend to trigger native flight remains largely unanswered.

[1] For example, Hennig (2020) showed that establishment of refugee shelters tends to decrease rental prices and ratings of amenities around the shelters.

Our study provides new evidence of native avoidance following an increase in the number of immigrants and insight into the reasons for this avoidance using a unique administrative dataset from Seoul, South Korea. South Korea recorded an astonishing 372 percent increase in the number of immigrants from 2000 to 2017, the largest growth in Asia, excluding the Middle East (United Nations, 2017).

The case of South Korean immigration is unique, as a significant share of immigrants consists of overseas Koreans who are of the same ethnicity as the natives. Overseas Koreans are ethnic Koreans who emigrated to neighboring countries such as China and Russia in the early 20th century and their (second-generation) descendants. They are often perceived as immigrants by natives in South Korea. According to the Perception Survey of Overseas Koreans (Ministry of Foreign Affairs, 2007), less than half of native South Koreans view overseas Koreans as native Koreans.

In this study, we gather high-quality administrative datasets from various sources, which are combined at the level of the smallest administrative unit within Seoul. This enables us to analyze the impact of the increased number of immigrants on natives' residential neighborhoods within a metropolitan area. Furthermore, we utilize a novel administrative dataset related to the internal migration of natives and their specific reasons for moving, gathered from official government records of residential address changes. This provides a rare opportunity to investigate natives' responses to the increased density of immigrants within their neighborhoods through their own stated reasons for moving.

Our identification strategy exploits the expansion of the visa programs for overseas Koreans that began in 2007. Particularly, the F-4 visa allows almost unrestricted economic activities and a largely unlimited length of stay for ethnic Koreans. Using the predetermined spatial distribution of each immigrant group in 2003 as the weight, we computed the predicted increase in the number of overseas Koreans—driven by the F-4 visa—in 418 neighborhoods in Seoul. Because this instrument exploits the sharp increase in ethnic Korean immigrants from China to South Korea due to government policy, it is arguably more exogenous than the classical shift-share instrument, which uses the national increase in immigrants as shocks (Borusyak et al., 2019). Furthermore, the composition of the country of origin of immigrants using the F-4 visa is significantly different from the existing composition of immigrants in South Korea, relieving concerns regarding the conflation of short- and long-term responses to immigration (Jaeger et al., 2018). Last, the instrument is not significantly correlated with the pre-trend for the period of 2000–2006, which builds the credibility of our research design (Goldsmith-Pinkham et al., 2020).

We find that the growth in immigrant communities within Seoul during the 2006–2015 period led to a substantial decrease in native in-migration, which is consistent with previous literature regarding native flight. Specifically, our analysis reveals that, on average, neighborhoods in Seoul lost more than six natives for every ten immigrant arrivals. This indicates that the inflow of ten immigrants to a neighborhood led to a net increase of four residents in the neighborhood. During the same period, the growing presence of immigrants did not lead to an increase in the neighborhood real estate values, suggesting the existence of negative differentials.

The richness of our dataset allows us to go one step further. By decomposing the migration of natives according to self-reported reasons, we find that native flight occurred especially for housing- or family-related reasons. We also find that some natives, especially young workers, simultaneously *moved into* immigrant areas for job-related reasons. This in-migration of natives for job-related reasons holds up even when controlling for industry composition at the neighborhood level. This new finding suggests that immigrant inflows can provide both pull and push factors for natives, while the net effect remains negative.

The unique composition of immigrants in South Korea helps us to narrow down the plausible mechanisms driving native flight. Because a large influx of overseas Koreans still generates native flight, we rule out ethnic heterogeneity and language barrier as possible dominant factors. This result may be compared to the case of "white flight" that was induced by the migration of African Americans from rural areas to cities in the United States (US) during the period between 1940 and 1970, although this may not have been caused only by race but also by reasons such as the low socio-economic status of immigrants (Boustan, 2007, 2010; Saiz and Wachter, 2011). Moreover, we show that natives may have different motivations for choosing to move into or out of neighborhoods where there is a significant presence of immigrants.

Using a novel administrative dataset related to the overall inflow and outflow of the native population at the granular level, we contribute to the immigration literature in several ways. First, the existing "native flight" literature focuses on the net reduction in the stock of natives in response to immigrant inflows, due to data limitations (e.g., Saiz and Wachter, 2011). However, the crowding-out effect can be due to a reduction in the inflows or an increase in the flight of natives. We disentangle these two distinct types of flow and show that the effects on the reduction of inflows are more significant.

Second, we analyze the heterogenous effects of immigrants on different group of natives based on their reasons for moving, such as for a job, for education, and for family-related reasons. We show that, while some groups of natives leave places with a growing population of immigrants, natives can also be drawn into these places, particularly for employment opportunities. Our findings suggest that native avoidance of immigrant communities may be even more significant than the previous estimates suggest, because the net migration includes the *inflow* of natives for employment opportunities. Once we subtract this positive effect from the net migration, the level of native avoidance of immigrant areas due to a negative view of immigrants would be very large. Third, while our identification strategy is based on the often-used shift-share instrument, using past immigration shares, our instrument is potentially more exogenous. We exploit a natural experiment, which includes a sudden increase in the number as well as a change in the composition of immigrants, when constructing the shift-share instrument.

The rest of this paper is organized as follows: Section 2 describes background information about the composition of immigrant groups in South Korea, Section 3 describes the data, and Section 4 explains the empirical approach we applied in this study before providing the results. We review the robustness checks in Section 5. In Section 6, we offer concluding remarks.

II. Background

South Korea has been experiencing a rapid increase in the inflow of immigrants. In 2007, more than a million foreigners were living in Korea. From 2007 to 2017, the number doubled, bringing the number of foreigners residing in Korea to more than 2 million (Ministry of Justice, 2017). During the same 10-year period, the native population of Korea increased by only 5.6 percent, or about 0.55 percent annually. A significant number of the foreigners stay in Korea with visas for 1 year or longer, and as of 2017, this number exceeded 1.5 million (70 percent of the total).

The demand for immigrant workers is primarily in relation to low-skill or unskilled jobs in factories, construction, and services (Park, 2017). In 2016, the most significant industries hiring migrant workers were manufacturing and mining (46 percent), followed by wholesale, retail, accommodation, and food services (19 percent), and business-related, personal, and public services (19 percent; Ministry of Justice, 2017). By way of comparison, only 17 percent of the economically active native population in Korea is involved in labor activities related to manufacturing and mining (Statistics Korea, 2017).

Immigrants in Korea tend to have lower levels of education than do native Koreans (Table 1). According to the Population and Housing Census of Korea for the city of Seoul in 2015, the number of immigrants who had completed a college degree or a higher level of education was 32.5 percent for individuals 25 years or older; however, 54.4 percent of native Koreans in Seoul in the same age group had college degrees. This gap increases if we exclude the older population and consider only those aged 25 to 64 (33.4 percent for foreigners versus 61.6 percent for natives).

TABLE 1 — EDUCATION LEVELS OF IMMIGRANTS AND NATIVES IN SEOUL (2015)

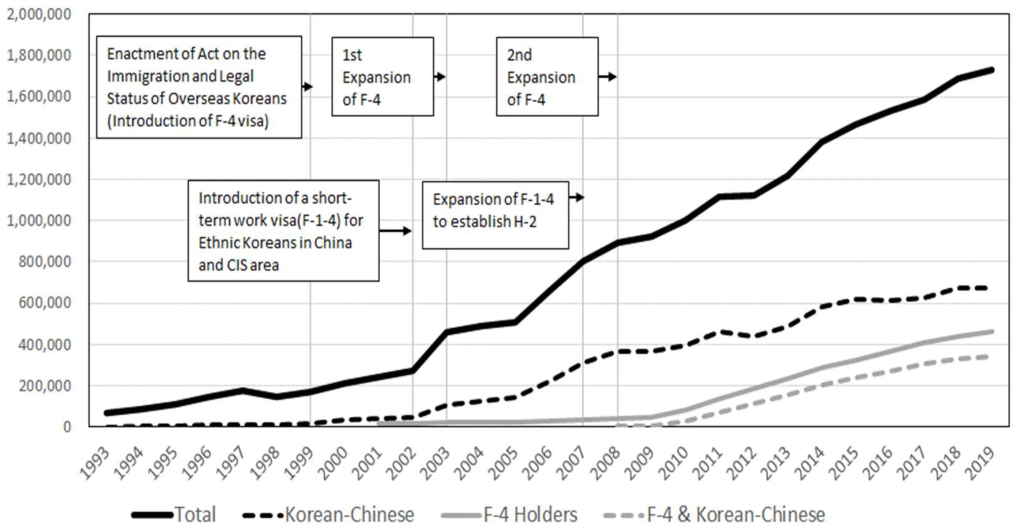
	Age	Total	Education Level			
			No Education	Primary	Secondary	Tertiary+
Immigrants	25+	260,906 (100%)	2,244 (0.9%)	19,783 (7.6%)	154,129 (59.1%)	84,750 (32.5%)
	25–64	244,920 (100%)	636 (0.3%)	15,038 (6.1%)	147,555 (60.2%)	81,691 (33.4%)
Natives	25+	7,169,289 (100%)	124,903 (1.7%)	514,883 (7.2%)	2,626,969 (36.6%)	3,902,534 (54.4%)
	25–64	5,968,868 (100%)	9,353 (0.2%)	174,884 (2.9%)	2,109,572 (35.3%)	3,675,059 (61.6%)

Source: Statistics Korea, "Population and Housing Census of Korea," 2015

A unique feature of immigration in South Korea is that a large portion of immigrants are overseas Koreans. This phenomenon relies heavily on two visa programs, F-4 and H-2 visas. Early in the 20th century, many Koreans emigrated to China, the former Soviet Union area, and other countries.[2] In 1999, as the Act on the Immigration and Legal Status of Overseas Koreans was enacted, overseas Koreans who had emigrated before 1948 were given a legal qualification to stay in Korea with an F-4 visa. In 2002, the Korean government introduced a new short-term work visa (F-1-4) for overseas Koreans in China and some countries in the Commonwealth of Independent States (CIS) area.[3] This new legal status allowed them to work in some low-skilled service industries. In 2003, the F-4 visa was expanded so that it also included overseas Koreans who emigrated after 1948, but

[2] Many of these overseas Koreans are Korean-Chinese, and they account for the majority of immigrants in Korea.
[3] Uzbekistan, Kazakhstan, Kyrgyzstan, Ukraine, and Tadzhikistan.

those who live in China and the CIS area were excluded from this expansion because the Korean government was concerned about negative effects on the domestic labor market. In 2007, the short-term work visa (F-1-4) was expanded and re-introduced as an H-2 visa, which allowed for 3 years to 4 years and 10 months of work in Korea for overseas Koreans from China and the CIS area. In 2008, the F-4 visa was finally expanded to include overseas Koreans in China and the CIS area, increasing the number of F-4 holders thereafter, as seen in Figure 1.



Source: Ministry of Justice (2020)

FIGURE 1: NUMBER OF IMMIGRANTS TO SOUTH KOREA

Table 2 provides further information about the two visa programs. In 2017, the number of F-4 visa holders staying in Korea was more than 400,000, and the number of immigrants in possession of an H-2 visa was approximately 240,000 (Ministry of Justice, 2018).

TABLE 2 — VISAS GRANTED TO ETHNIC KOREANS

Visa Name	Visa Code	Maximum Length of Residence	Right to Work	Number (2017)
Overseas Koreans	F-4	Semi-permanent*	Yes	415,121
Working Visit	H-2	4 years and 10 months	Restricted to some manual work	238,880

**Note:* The F-4 visa can be renewed repeatedly with certain restrictions; it is, therefore, referred to as "semi-permanent."
Source: Ministry of Justice, "Korean Immigration Service Statistics," 2018

Ethnic Korean immigrants from China account for the largest portion of overseas Koreans residing in Korea. Of the worldwide total of 20 million Korean Chinese, almost 20 percent resided in Korea in 2009 (Lee, 2010). In 2015, 86 percent of overseas Korean immigrants were of Chinese origin (Ministry of Justice, 2016). In Korea, Korean Chinese are usually perceived by native Koreans to be immigrants with a lower socio-economic status. For instance, according to the Perception Survey of Overseas Koreans (Ministry of Foreign Affairs, 2007), about 50 percent of native Koreans think that Korean Chinese have a lower economic standard than do natives. This perception may shape negative views toward Korean Chinese immigrants.

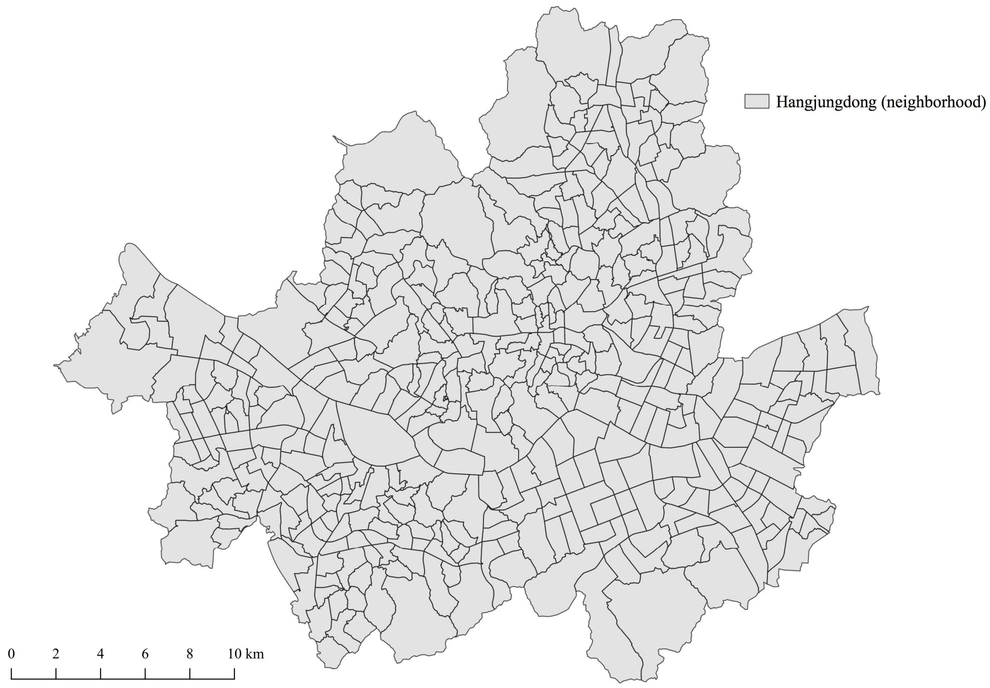
III. Data

Our main analysis focuses on Seoul, the capital and the largest city in South Korea. The demographic characteristics of the city allow us to investigate natives' neighborhood choice within a densely populated metropolitan area. In 2015, the total population of Seoul was 10,485,620, including 457,806 members of the foreign-born population sub-group.[4]

The regional unit of our analysis is the *hangjungdong*, which is the smallest administrative unit within a city in South Korea. Seoul (605.2 km^2) has 424 hangjungdongs, each of which is approximately 1.4 km^2 with 23,000 residents (Figure 2). To keep the geographic units constant, we use data related to the hangjungdongs as they existed in 2015, with only slight changes.[5] This regional unit is comparable to the census tract of the US, which was used in Saiz and Wachter (2011).

[4] The foreign-born population is composed of foreign residents (including migrant workers, marriage migrants, foreign students, overseas Koreans), naturalized residents, and children of an immigrant background. This study does not consider short-term residents who stay less than 90 days.

[5] In total, there were 518 hanjungdongs in 2006 and 423 hanjungdongs in 2015. We redefine 418 neighborhood areas, which mostly overlap with the hanjungdongs in existence in 2015 (Figure 2). Three hangjungdongs in 2015 (Wolgye 1, 2, 3) are combined into one neighborhood area, since their inner borderlines have been changed. We also discard three outliers where the growth rate of domestic residents between 2006 and 2015 exceeded 1,000 percent.



Note: The hangjungdong-level administrative boundaries in the geographic information system (GIS) format are from the Statistical Geographic Information Service by Statics Korea.

FIGURE 2: A MAP SHOWING THE HANGJUNGDONGS OF SEOUL IN 2015

A. Data Sources

We combine various available sources of administrative data at the small neighborhood level. The first set of data is from the Statistics of the Registered Population (2006–2015) and the Statistics on Foreign Residents by Local Governments (2006–2015). These administrative statistics are used to determine the numbers of residents by nationality in each neighborhood. We also use this set of data for earlier years (1998, 2000, and 2003), to construct our instrument and examine correlations between our instrument and pre-trends.

The second set of data is based on move-in registration records. The move-in registration form is mandatory for all domestic residents who move into a new neighborhood. Therefore, the dataset includes all official moving records. The Statistics on Internal Migration (SIM) data—an individual-level dataset provided by Statistics Korea—includes the application date, origin, and destination neighborhoods of the applicant (coded at the hangjungdong level), the main reason for moving, and family characteristics such as the age and gender of each family member. Submission of the application is required within 14 days after moving.

It is noteworthy that a question regarding the main reason for moving exists.[6] This provides a rare look into the reasons behind the internal migration of domestic residents with a substantial sample size. Applicants choose from seven possible answers: job, education, family,[7] residential environment,[8] housing,[9] natural environment, and other reasons.

The third set of administrative data is the Officially Assessed Reference (OAR) land price (2006–2015), which is assessed and disclosed by the Ministry of

[6] The official move-in registration form includes this survey question, and the applicant is obligated to answer this question truthfully in accordance with the Statistical Law.

[7] To live with family, for marriage, or to live away from family.

[8] Transportation, cultural facilities, or other local amenities.

[9] Home purchase, lease termination, rents, or redevelopment.

Land, Infrastructure, and Transport.[10] While the OAR price is often lower than the actual sale price of property in the region, it is less susceptible to selection bias, more representative of the regional characteristics, and more stable. We compute the local-average OAR price from the total price and area of the land used for residential or commercial purposes in each neighborhood.

Last, using the locations of metro stations and schools in Seoul in 2006, we construct various control variables such as the number of nearby metro stations, the distance to the nearest international school, and the school district (see the map of school districts, Appendix A) of each regional unit. We also use data from the Census of Establishments of 2006, containing information on the number of establishments and workers (according to industry) in each neighborhood, to construct additional control variables.

B. Descriptive Statistics

Table 3 shows a summary of the statistics from the sample. In 2015, the average population per neighborhood was approximately 25,000, with individual neighborhoods' populations ranging from 1,000 to 86,000. Between 2006 and 2015, immigrant inflows accounted for about 3 percent of the total population in 2006. However, some neighborhoods showed an increase of more than 10 percent, with

[10] A complication in our study arises as the OAR price information is provided at the beobjeongdong level, a more traditional unit for neighborhoods. We processed this price information into hangjungdong level-data by using an officially-provided mapping of the beobjeongdong and hangjungdong codes.

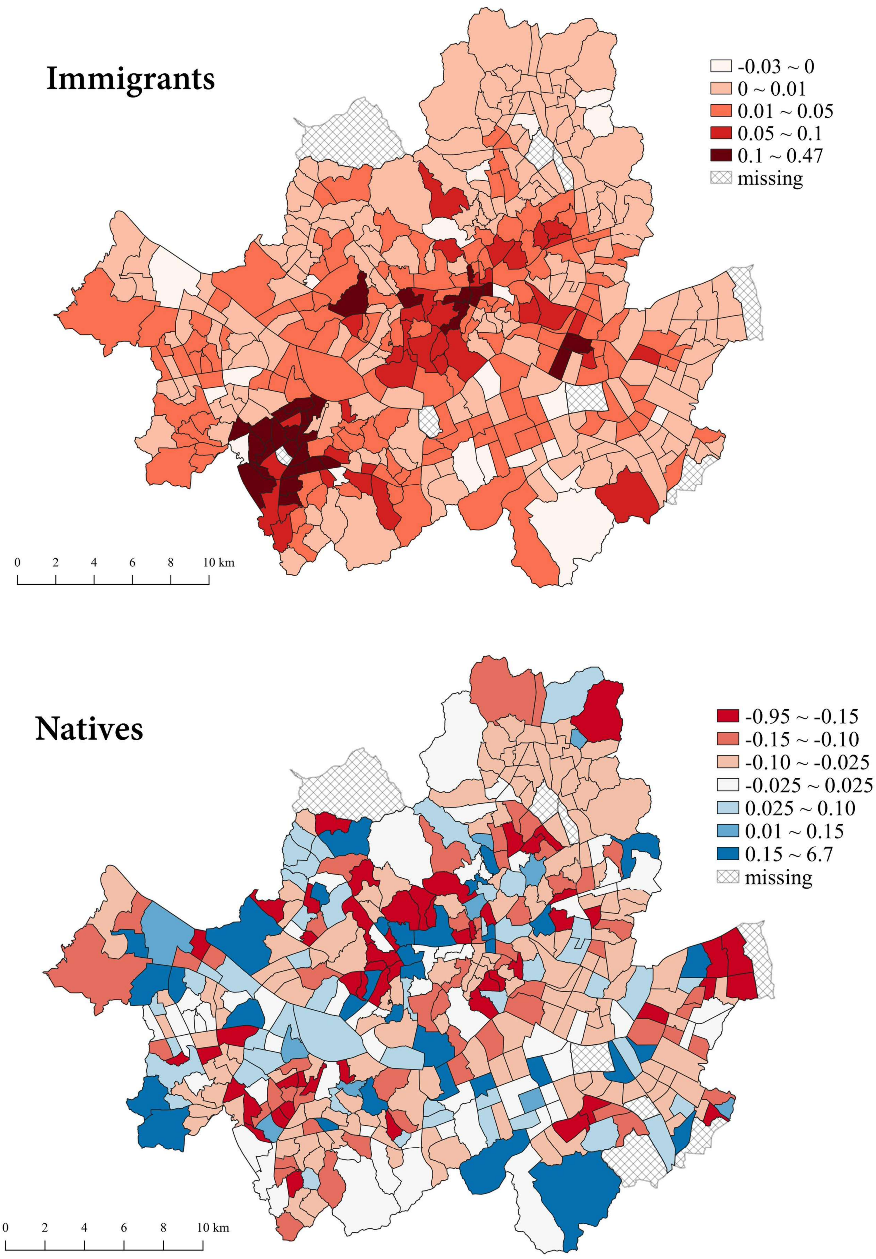
the highest growth being 47 percent. During the same period, the native population increased by an average of 1 percent. The causal relationship between these two variables is of significant interest to this study.

Figure 3 shows the spatial variations of these two variables. Upon first glance at the figure, the distribution of immigrants seems more concentrated relative to the total population. Also, we can identify regions exhibiting a decrease in the native population where there was a substantial concentration of immigrants. However, it is not immediately evident whether this negative correlation is causal. To obtain the causal estimates, we use the F-4 visa–imputed increase in the number of immigrants, which we will explain in detail in the next section. Other variables are used as control variables in our regressions.

TABLE 3 — DESCRIPTIVE STATISTICS

Variable	Obs	Mean	SD	Min	Max
Population (2006)	418	24,762	9,764	1,320	94,128
Population (2015)	418	24,742	9,858	1,003	86,609
Population Density (2006, per km^2)	418	25,631	12,844	548	60,207
Area (2006, km^2)	418	1.41	1.52	0.22	13.24
Growth Rate of Native Population	418	0.01	0.42	−0.95	6.70
Growth Rate of Immigrant Population	418	0.03	0.05	−0.03	0.47
Share: 65+ years	418	0.07	0.02	0.02	0.39
Share: Male	418	0.50	0.01	0.46	0.58
Number of Metro stations	418	0.87	1.17	0	6
Distance to the Nearest International School	418	1.04	0.61	−1.48	2.44
OAR Land Price (2006, MM₩/m^2)	418	3.09	1.55	1.29	14.72
OAR Land Price (2015, MM₩/m^2)	418	4.46	2.38	1.72	18.38
Share (Employment): Manufacturing	418	0.09	0.08	0.00	0.50
Share (Employment): Construction	418	0.05	0.05	0.00	0.31
Share (Employment): Services	418	0.85	0.09	0.46	0.99
Share: Restaurants, Hotels, Wholesale, and Retail	418	0.30	0.10	0.10	0.84
Shift-Share IV	418	0.75	1.21	0.01	13.63
Net Flow 2015 (/Population 2006)	418	−0.07	0.40	−0.99	6.57

Note: SD = standard deviation



Note: The values shown in the map are standardized by the size of the total population in 2006. To calculate the changes in the native population, the Statistics of the Registered Population dataset was used. To compute the change in the number of immigrants, we used the Statistics on Foreign Residents by Local Governments. The hangjungdong-level administrative boundaries in GIS format are from Statistical Geographic Information Service by Statics Korea.

FIGURE 3: CHANGE IN THE NUMBER OF NATIVES AND IMMIGRANTS (2006–2015)

IV. Empirical Framework

Using the data specified in Section 3, we empirically investigate natives' responses to the inflow of immigrants, particularly whether they leave their residential neighborhoods due to the inflow. The basic specification we estimate takes the following form:

$$(1) \qquad \frac{\Delta N_i}{L_{i,2006}} = \beta \frac{\Delta I_i}{L_{i,2006}} + \Theta X_i + \gamma_d + \varepsilon_i.$$

The dependent variable ($\Delta N_i / L_{i,2006}$) is the change in the native population from 2006 to 2015, standardized by the total population in the initial year (2006). The explanatory variable ($\Delta I_i / L_{i,2006}$) is the change in immigrants, standardized in the same manner as the dependent variable. The term X_i includes other neighborhood-specific controls such as population density and industrial structure. The term γ_d represents school-district fixed effects. Finally, ε_i is a zero mean idiosyncratic random error.

Because the dependent variable and explanatory variable are transformed in the same way, the coefficient β can be interpreted as the change in the number of natives owing to a one-person increase in the number of immigrants. For instance, $\beta = -1$ indicates a full displacement effect or a "crowding-out" effect, while $\beta = 0$ indicates no displacement.

This basic specification closely follows Card (2001, 2007), who estimated the magnitude of native displacement in response to immigration across the local labor market.[11] The only difference in our specification is the unit of analysis. We use cross-neighborhood variations within a single local labor market (Seoul) instead of a cross-city variation.

Although we control for characteristics such as the neighborhood and school-district fixed effects, the estimates from simple regressions are likely to be biased due to omitted variables and reverse causality. For example, unobservable neighborhood-level amenities—such as school quality—could be correlated with the inflow of immigrants.[12] Additionally, immigrants may avoid neighborhoods with a specific native demographic. Accordingly, interpreting the estimates as being causal requires exogenous shocks in immigration across neighborhoods.

Before turning our attention to these challenges, we first show our results from the simple regressions to indicate the correlation between the change in natives and the change in immigrants. Table 4 describes the ordinary least squares (OLS) results from our regression. Column 1 shows a basic specification that includes a logarithm of the total population and the population density in the initial

[11] Using microsimulations, Peri and Sparber (2011) concluded that—among many others—this specification performs well and correctly uncovers negative relationships when displacement exists.

[12] Native flight due to deteriorated school quality (e.g., Betts and Fairlie, 2003; Cascio and Lewis, 2012) may also occur in Seoul. This study, however, abstracts from the issue by controlling for school district fixed effects. In Seoul, natives' movements based on school quality mostly occur *across* school districts. In pursuit of equal educational opportunities, Seoul has maintained a strict equalization policy since 1974. As a part of the equalization policy, students were randomly assigned to a nearby (high) school within each school district (e.g., Han and Ryu, 2017; Hahn et al., 2018). Most of the endogenous correlation between internal migration and school quality can be removed by controlling for school district fixed effects.

year (2006). In Columns 2 and 3, we progressively include other neighborhood-level characteristics. Finally, in Column 4, we also add the 11 school-district fixed effects to get rid of unobservable factors that vary across school districts. This means we use the variation within the school district to estimate the crowding-out effect of immigrants.

TABLE 4: NEIGHBORHOOD CHOICES OF NATIVES IN RESPONSE TO THE INFLOW OF IMMIGRANTS (OLS REGRESSION)

	(1)	(2)	(3)	(4)
$\Delta I_i / L_{i,2006}$	−0.176	−0.187	−0.137	−0.082
	(0.118)	(0.127)	(0.146)	(0.202)
$log(L_{i,2006})$	−0.119***	−0.134***	−0.138***	−0.171***
	(0.043)	(0.046)	(0.048)	(0.058)
Population Density	−0.091***	−0.098***	−0.101**	−0.095***
	(0.033)	(0.035)	(0.040)	(0.035)
Share Old		−1.749*	−1.580	0.084
		(0.934)	(1.086)	(1.489)
Share Male		−0.229	−0.728	−0.432
		(0.748)	(0.813)	(0.939)
# of Metro Stations			0.000	0.000
			(0.010)	(0.010)
Distance to International School			0.039**	0.018
			(0.017)	(0.019)
Share Manufacturing			−0.001	0.090
			(0.104)	(0.113)
Share Construction			0.265	0.208
			(0.231)	(0.233)
Share Service			0.101	0.119
			(0.231)	(0.233)
Housing Price			−0.015	−0.055
			(0.040)	(0.100)
School-District Fixed Effect				X
Observations	418	418	418	418
R-squared	0.089	0.095	0.105	0.124

Notes: The dependent variable is the change in the native population between 2006 and 2015 relative to the total population in 2006. The explanatory variable is the change in immigrants between 2006 and 2015, relative to the total population in 2006. The robust standard errors are in parentheses. All regressions are weighted by total population in 2006.

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

Source: Author's calculations.

Focusing on the coefficient of interest, β, all the estimates are negative and range between -0.18 and -0.09, although they are not statistically significant. For example, Column 3 shows that an increase of 1 immigrant is associated with a decrease of approximately 0.12 natives. However, these estimates could be overestimated due to unobservable neighborhood-level shocks being likely to affect both natives and immigrants in the same way. For instance, both native and immigrant households may be similarly affected by a new housing development in the neighborhood. To address these issues, we develop an instrumental variable strategy.

A. Instrumental Variable

As a source of a plausibly exogenous variation in immigrants, we use the introduction of the special visa programs for overseas Koreans as a supply-push factor that is exogenous to neighborhood conditions. Since the introduction of the visa programs, there has been remarkable growth in the number of overseas Korean immigrants. Table 5 documents this significant growth using data from the F-4 visa system.

TABLE 5: THE INCREASE IN IMMIGRANTS BASED ON DATA FROM THE F-4 VISA SYSTEM

	Total Immigrants	F-4 Visa (Overseas Koreans)			
		Total	From China	From the US	From Canada
2008	1,158,866	41,732	2,453	27,513	6,584
2016	2,049,441	372,533	275,342	45,784	15,846
Growth Rate	76.9%	792.7%	11,124.7%	66.4%	140.7%

Source: F-4 visa system

From 2008 to 2016, there was an almost 800 percent increase in the number of overseas Koreans, while the increase in the overall number of immigrants was 77 percent. Among overseas Koreans, the most significant area of increase was in the number of Korean Chinese immigrants, which showed a remarkable 11,000 percent increase. Because most of these overseas Koreans moved to and settled in foreign countries a long time ago, they tend to choose neighborhoods with communities similar to their adopted home country. For example, many Korean Chinese move into Daerim-dong, which has a large Chinese population.

To capture and use the variation from this large and sudden increase in the number of overseas Koreans by ethnicity in this study, we interact the growth in the overseas Korean population following the expansion of the F-4 visa program with immigrant enclaves across neighborhoods in Seoul, as follows:

$$\frac{\widehat{\Delta I_i}}{L_{i,2000}} = \sum_c \left[\left(I_{i,2003} \cdot \delta_c^{\mathrm{G(i)}} \right) \cdot g_c \right] \cdot \frac{1}{L_{i,2000}}. \quad (2)$$

The first part, $(I_{i,2003} \cdot \delta_c^{G(i)})$, is the predicted number of immigrants in neighborhood i by country of origin c, combining two different terms.[13] Specifically, the term $I_{i,2003}$ is the number of immigrants in neighborhood i in 2003, a year before the expansion of the F-4 visa program. The term $\delta_c^{\mathrm{G(i)}}$ is the fraction of nationality c out of the total immigrants in *Gu G(i)* in 2004.[14] We use this Gu-level share of immigrants because the hanjungdong-level share is not available for the year 2004. The second part, g_c, is the growth rate of overseas Koreans between 2008 and 2016 by nationality c.[15] Finally, by multiplying these two parts and then standardizing it by the total population in 2000 ($L_{i,2000}$),[16] we predict the change in the number of immigrants due to the national shifts in overseas Koreans, which were caused by the expansion of the F-4 visa program.

This identification strategy closely follows those of Altonji and Card (1991) and Card (2001). While our identification is similar in exploiting the variations in existing immigrant communities, we use the exogenous expansion of the F-4 visa program as a supply-push factor rather than the overall growth of immigrants. In this sense, our approach is in line with that of Peri et al. (2015), who used large

[13] We use 13 countries of origins. While overseas Koreans are mostly from China, there are substantial variations across the countries of origins.

[14] A "Gu" consists of several neighborhoods and is the second-smallest administrative unit in South Korea. A school district in Seoul consists of two or three Gus.

[15] We use 2008 as the base year in calculating the growth rate to exploit the policy-driven growth of overseas Koreans.

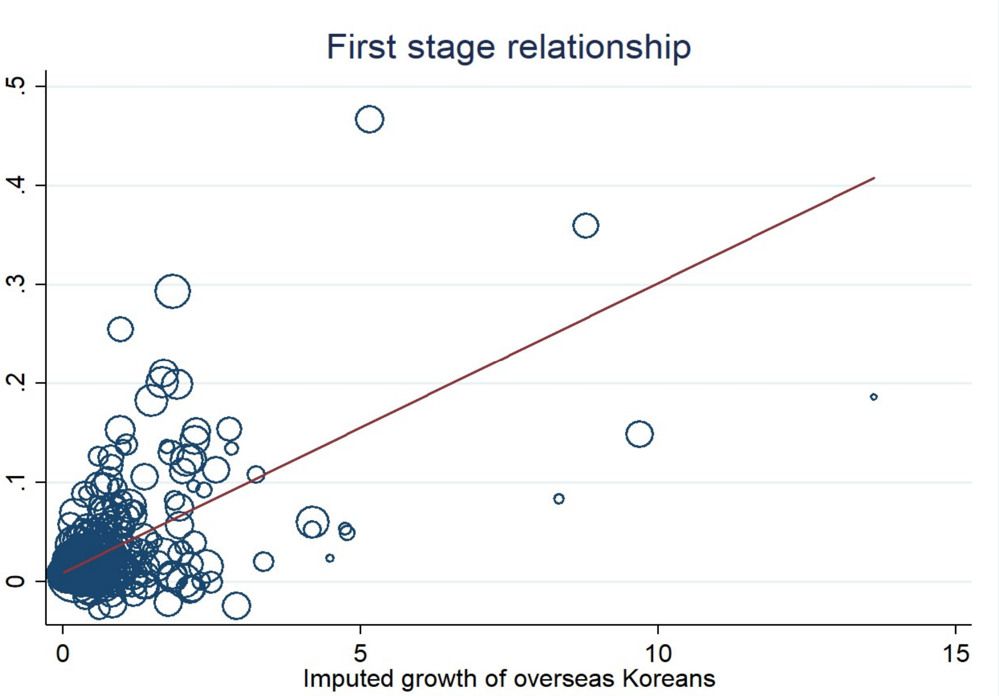
[16] We use 2000 as the base year for standardization because of the pre-trend tests. Changing the base year, say to 2003, does not meaningfully alter the results.

shifts in the national H-1B visa policy in the US interacted with immigrant communities.

Using this policy-driven shift as a supply-push factor has several advantages, compared to the standard immigration enclave instrument. First, we use the sharp increase in immigrants (overseas Koreans) due to the policy change and are, thus, more likely capture the supply shock of immigrants. Second, the expansion of the F-4 visa program resulted in substantial changes in the countries of origin of the immigrants to Korea. For example, the share of Korean Chinese immigrants has significantly expanded since 2007. This suggests that our instrument is less likely to conflate short- and long-term responses to the inflow of immigrants (Jaeger et al., 2018).

Formally, for the exclusion restriction, our model hinges on an important assumption: the interaction between the expansion of the F-4 visa program and immigrant enclaves in 2003 is uncorrelated with other neighborhood-level characteristics that affect natives' residential location choice. In other words, our instrument—after controlling for other characteristics—affects the distribution of natives only through the inflow of immigrants. The predetermined distribution of foreign nationals in 2003 is less likely to be correlated with other local factors because the number of immigrants before 2004 was small and relatively stable, while immigration numbers have recently increased significantly.

Before we formal describe our first-stage regression results, Figure 4 shows the relationship between our imputed instrument and the actual change in immigrants across neighborhoods in Seoul. Specifically, we put our main explanatory variable ($\Delta I_i/L_{i,2006}$) in the y-axis and our instrument ($\widehat{\Delta I_i}/L_{i,2000}$) in the x-axis. The size of the circles represents the size of the population in 2006, and the line indicates the linear regression fit. There are several notable points in this figure. First, there are significant variations in the increase in the number of overseas Koreans, due to the expansion of the F-4 visa program (see Table 5, above). Second, and more importantly, the model strongly predicts the actual inflow of immigrants, showing sufficient power in the first stage. This indicates that the expansion of the F-4 visa program has generated sufficient variation in the inflow of overseas Koreans.



Notes: This figure is a scatter plot showing the first-stage relationship graphically. Our instrument, the imputed growth of overseas Koreans ($\widehat{\Delta I_i}/L_{i,2000}$), is in the x-axis. The y-axis is the main explanatory variable, the actual growth in the number of overseas Koreans ($\Delta I_i/L_{i,2006}$) from 2006 to 2015.

FIGURE 4: FIRST-STAGE SCATTER PLOT – THE IMPUTED INCREASE IN THE NUMBER OF OVERSEAS KOREANS

Formally, our first-stage regressions are as follows:

(3) $$\frac{\Delta I_i}{L_{i,2006}} = \phi \frac{\widehat{\Delta I_i}}{L_{i,2000}} + \Gamma X_i + \sigma_d + u_i.$$

The coefficient ϕ is our main explanatory variable in Equation (1), representing the impact of the F-4 visa program–driven increase in the number of overseas Koreans compared to the actual increase in the number of immigrants. The positive and statistically significant coefficient indicates that our model effectively predicts the actual change in the immigrant population and should provide reasonable estimates in our second-stage regressions.

Table 6 shows these first-stage results, with each column essentially mirroring the OLS results shown in Table 4. Across all the specifications, the imputed inflow of overseas Koreans into neighborhoods strongly predicts the actual inflow of immigrants. Specifically, an increase of 1 percentage point in the predicted inflow of overseas Koreans leads to an increase of 0.03 percentage points for immigrants in general. These estimates are highly significant, even when considering the school-district fixed effects in Column 4. The F-statistics are usually above 15 and, thus, free from weak-instrument bias, confirming that our model has sufficient power.

TABLE 6 — FIRST-STAGE REGRESSIONS

	(1)	(2)	(3)	(4)
$\widehat{\Delta I_i}\ / L_{i,2006}$	0.030***	0.027***	0.028***	0.022***
	(0.006)	(0.006)	(0.007)	(0.006)
$log(L_{i,2006})$	−0.008	−0.008	−0.010	−0.008
	(0.005)	(0.005)	(0.006)	(0.006)
Population Density	0.012***	0.013***	0.010***	0.007**
	(0.003)	(0.003)	(0.003)	(0.003)
Share Old		−0.035	−0.216	−0.243
		(0.135)	(0.165)	(0.189)
Share Male		0.603***	0.593***	0.327*
		(0.171)	(0.206)	(0.190)
# of Metro Stations			0.000	−0.001
			(0.002)	(0.002)
Distance to International School			−0.005*	−0.004
			(0.003)	(0.003)
Share Manufacturing			−0.039	−0.054*
			(0.027)	(0.032)
Share Construction			0.032	0.023
			(0.032)	(0.032)
Share Service			0.056**	0.056**
			(0.027)	(0.026)
Housing Price			−0.016**	−0.002
			(0.006)	(0.010)
First-Stage *F* (on Excluded IV)	21.32	18.25	17.15	11.00
School-District Fixed Effects				X
Observations	418	418	418	418
R-squared	0.341	0.363	0.388	0.457

Notes: The dependent variable is the change in the number of immigrants between 2006 and 2015, relative to the total population in 2006. The explanatory variable is the imputed change in the number of immigrants between 2006 and 2015, relative to the total population in 2000. The robust standard errors are in parentheses. All regressions are weighted by the total population in 2006.

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

Table 7 provides further suggestive evidence for the validity of our instrument. We ran falsification tests to examine the possibility of a spurious correlation between our model and the pre-period (2000–2006) change of natives. Column 1 shows our main explanatory variable, which is potentially endogenous with the pre-period net migration of natives, and we find a significant negative correlation between them. This implies that immigrants have moved to places where natives have departed. Columns 2 to 5 show similar regressions with our instrument (instead of the main explanatory variable). Column 2 shows the pre-trends of all natives, Column 3 extends the pre-trends back to 1998 (1998–2006), and Columns 4 and 5 test the pre-trends by gender. If our instrument is valid, these correlations should be reasonably close to zero (Goldsmith-Pinkham et al., 2020). The estimates in Columns 2 to 5 are small and statistically not different from zero, suggesting that our instrument is less likely to be correlated with unobservable confounders.

TABLE 7 — FALSIFICATION TESTS ON THE NET MIGRATION OF NATIVES – 2005 TO 2006

	(1) All (2000–2006)	(2) All (2000–2006)	(3) All (1998–2006)	(4) Male (2000–2006)	(5) Female (2000–2006)
$\Delta I_i/L_{i,2006}$	−0.617***				
	(0.152)				
$\widehat{\Delta I_i}\ /L_{i,2006}$		−0.002	−0.010	−0.002	0.000
		(0.008)	(0.011)	(0.004)	(0.004)
$log(L_{i,2006})$	0.066***	0.076***	0.088*	0.038***	0.038***
	(0.024)	(0.024)	(0.048)	(0.012)	(0.012)
Population Density	0.042**	0.036*	0.040	0.018*	0.019*
	(0.021)	(0.020)	(0.035)	(0.010)	(0.010)
Share Old	0.326	0.484	−0.565	0.300	0.184
	(0.795)	(0.801)	(1.223)	(0.393)	(0.409)
Share Male	0.411	−0.306	−1.042	0.162	-0.468
	(0.585)	(0.587)	(0.846)	(0.297)	(0.296)
# of Metro Stations	0.000	−0.001	0.005	0.000	0.000
	(0.008)	(0.008)	(0.012)	(0.004)	(0.004)
Distance to International School	0.016	0.024	0.012	0.011	0.012
	(0.016)	(0.016)	(0.025)	(0.008)	(0.008)
Share Manufacturing	−0.121	−0.133	−0.132	−0.075	−0.058
	(0.143)	(0.149)	(0.322)	(0.074)	(0.076)
Share Construction	0.144	0.117	0.255	0.058	0.060
	(0.184)	(0.187)	(0.394)	(0.092)	(0.096)
Share Service	−0.236**	−0.283**	−0.478***	−0.142**	−0.141**
	(0.120)	(0.117)	(0.177)	(0.058)	(0.059)
Housing Price	0.031	0.035	0.019	0.019	0.016
	(0.026)	(0.027)	(0.041)	(0.013)	(0.014)
Observations	418	418	418	418	418
R-squared	0.081	0.063	0.061	0.060	0.067

Notes: The dependent variable is the net migration of natives between 2005 and 2006, relative to the total population in 2005. The explanatory variable is the imputed change in the number of immigrants between 2006 and 2015, relative to the total population in 2000. The robust standard errors are in parentheses. All regressions are weighted by the total population in 2006.

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

B. Native Avoidance of Increase in Immigrants

Using the predicted change due to the introduction of the F-4 visa system as an instrument for the actual change in the inflow of immigrants, we present the two-stage least-squares (2SLS) estimates from Equation (1) in Table 8a. The first four columns of Table 8a mirror the OLS specifications in Table 4. Column 1 includes the logarithm of population and density in the initial year (2006). Column 2 adds more demographic controls, including the percentage share of the elderly (aged 65 or higher) and male populations. Column 3 is our preferred specification and includes local characteristics such as the number of metro stations and housing prices. Finally, Column 4 contains 11 school-district fixed effects, which control for fixed but unobservable neighborhood characteristics.

TABLE 8A — NEIGHBORHOOD CHOICES OF NATIVES IN RESPONSE TO THE INFLOW OF IMMIGRANTS

	(1) 2SLS	(2) 2SLS	(3) 2SLS	(4) 2SLS	(5) 2SLS	(5) Reduced Form
$\Delta I_i / L_{i,2006}$	−0.635**	−0.753**	−0.588*	−0.754*	−0.835**	
	(0.261)	(0.326)	(0.310)	(0.405)	(0.359)	
$\widehat{\Delta I_i} / L_{i,2006}$						−0.016*
						(0.009)
$log(L_{i,2006})$	−0.128***	−0.144***	−0.146***	−0.179***	0.126***	−0.173***
	(0.047)	(0.049)	(0.049)	(0.059)	(0.038)	(0.059)
Population Density	−0.086***	−0.092***	−0.097**	−0.092***	−0.074***	−0.097***
	(0.032)	(0.032)	(0.038)	(0.033)	(0.025)	(0.035)
Share Old		−1.819*	−1.698	−0.150	−1.417	0.034
		(0.947)	(1.101)	(1.452)	(1.086)	(1.467)
Share Male		0.432	−0.170	0.016	−0.024	−0.231
		(0.895)	(0.907)	(0.980)	(0.848)	(0.962)
# of Metro Stations			0.000	0.000	0.006	0.001
			(0.009)	(0.010)	(0.008)	(0.010)
Distance to International School			0.033**	0.013	0.022	0.016
			(0.017)	(0.019)	(0.018)	(0.020)
Share Manufacturing			0.012	0.082	0.031	0.123
			(0.102)	(0.109)	(0.095)	(0.116)
Share Construction			0.285	0.232	0.278	0.214
			(0.227)	(0.223)	(0.198)	(0.231)
Share Service			0.136	0.168	0.192	0.125
			(0.238)	(0.238)	(0.134)	(0.234)
Housing Price			−0.018	−0.046	0.011	−0.044)
			(0.039)	(0.097)	(0.058)	(0.100)
First-Stage *F* (on Excluded IV)	21.319	18.248	17.149	11.001	10.893	-
School-District Fixed Effect				X	X	X
Observations	418	418	418	418	412	418
R-squared	0.083	0.087	0.100	0.114	0.118	0.125

Notes: The dependent variable is the change in the native population between 2006 and 2015 relative to the total population in 2006. The explanatory variable is the change in the number of immigrants between 2006 and 2015, relative to the total population in 2006. The robust standard errors are in parentheses. All regressions are weighted by the total population in 2006.

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

The 2SLS estimates in Table 8a range between −0.8 and −0.5 and are statistically significant. This suggests that natives respond significantly to the increase in immigrants by avoiding immigrant communities. Particularly, Column 3 shows that a 100-person increase in immigrants leads to a decrease of approximately 59 natives. In other words, the total population increases by 41 because of a 100-person increase in immigrants. The 2SLS estimates are generally more negative than are the OLS estimates in Table 4. These confirm that some unobservable neighborhood-level shocks, such as large-scale community developments, affect natives and immigrants in the same way, resulting in an upward bias of the OLS estimates.

Columns 5 and 6 in Table 8a provide some simple robustness checks. In Column 5, we drop the observations of the top 1 percent and bottom 1 percent in the native population growth, because that large growth may introduce a spurious correlation. Column 6 shows our reduced-form estimate to check that our dependent variable and instrumental variable are negatively correlated. Reassuringly, the results in Columns 4 and 5 explain that immigrant inflows lead to a decrease in the native population.

The change in neighborhood values supports our interpretation that the net increase in the neighborhood population is smaller than the influx of immigrants due to native avoidance. In Table 8b, our OLS estimates show that the average price of land for residential and commercial purposes decreased by 0.23 to 0.39 percent between 2006 and 2015 for an increase of 1 percentage point in the immigrant share at the neighborhood level. However, the OLS estimates may reflect the effect of immigrants choosing to move to neighborhoods with relatively affordable housing. The 2SLS estimates using the same instrument show that the immigrant inflows did not increase the average land price. In spite of the net increase in the total population, the estimates show a negative sign, although they are not statistically significant due to having larger standard errors than those of the OLS estimates. This result is difficult to explain without the presence of the negative compensating differentials (e.g., Saiz and Watcher, 2011).

TABLE 8B — CHANGE IN NEIGHBORHOOD VALUES

	(1) OLS	(2) OLS	(3) OLS	(4) 2SLS	(5) 2SLS	(6) 2SLS
$\Delta I_i / L_{i,2006}$	−0.230*	−0.299**	−0.387***	−0.263	−0.368	−0.316
	(0.122)	(0.122)	(0.138)	(0.257)	(0.263)	(0.356)
$log(L_{i,2006})$	−0.030	−0.029	−0.010	−0.031	−0.031	−0.009
	(0.019)	(0.020)	(0.020)	(0.022)	(0.022)	(0.022)
Population Density	0.017	0.013	0.008	0.017	0.014	0.007
	(0.011)	(0.011)	(0.011)	(0.011)	(0.010)	(0.011)
Share Old	0.004	−0.135	−0.164	−0.001	−0.155	−0.130
	(0.601)	(0.669)	(0.986)	(0.600)	(0.667)	(0.977)
Share Male	0.211	0.225	−0.231	0.243	0.294	−0.269
	(0.616)	(0.640)	(0.671)	(0.629)	(0.645)	(0.660)
# of Metro Stations		0.001	0.002		0.001	0.002
		(0.006)	(0.007)		(0.006)	(0.006)
Distance to International School		−0.013	−0.018		−0.014	−0.017
		(0.013)	(0.014)		(0.013)	(0.014)
Share Manufacturing		0.056	0.036		0.057	0.037
		(0.079)	(0.079)		(0.077)	(0.077)
Share Construction		0.158	0.094		0.160	0.093
		(0.162)	(0.160)		(0.159)	(0.156)
Share Service		0.120	0.109		0.125*	0.104
		(0.076)	(0.074)		(0.074)	(0.073)
Housing Price		−0.016	−0.038		−0.017	−0.039
		(0.028)	(0.041)		(0.027)	(0.041)
First-Stage *F* (on Excluded IV)				18.248	17.149	11.001
School-District Fixed Effect			X			X
Observations	418	418	418	418	418	418
R-squared	0.015	0.027	0.089	0.015	0.027	0.089

Notes: The dependent variable is the change in the logarithm of average land price from 2006 to 2015. The explanatory variable is the change in the number of immigrants between 2006 and 2015, relative to the total population in 2006. The robust standard errors are in parentheses.

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

C. Reasons for Native Flight

While the results in Table 8a and 8b clearly illustrate that natives avoid neighborhoods in which there has been a substantial increase in immigrants, the factors causing these results are not apparent. To investigate the reasons for this crowding-out effect, we utilize the SIM data concerning between-neighborhood migrations of natives between 2006 and 2015. Specifically, we decompose the estimates in Table 8a according to the motivations of migrations, such as moving for a job or for housing. Furthermore, we investigate whether the estimated effects differ across different demographic groups of natives.

Panel A of Table 9 shows the net migration of natives according to their reason for relocation. Each outcome variable is standardized by the total population in the initial year (2006). Column 1 shows the overall change in the number of natives due to migration, which confirms the results from Table 8. That is, between 2006 and 2015, approximately 0.6 natives left their neighborhoods due to the inflow of immigrants.[17] Columns 2 to 6 explain the net migration of natives according to their reason for moving. Interestingly, Column 2 shows that the net migration of natives due to their jobs is actually positive, indicating that neighborhoods with a high concentration of immigrants have attracted some natives for job-related

17 Since the population changes arising from births and deaths are not counted in the statistics of moving, the estimate in Table 9 (Column 1) is not exactly the same as the estimate in Table 8. Nonetheless, this estimate from moving records is sufficiently close to the previous estimate from population statistics.

reasons. This may suggest that there is a complementarity between natives and immigrants at the neighborhood level (Peri and Sparber, 2009).

However, the native migration due to reasons other than job-related factors is consistent with the main results in Table 8. Specifically, the estimates in Column 3 and 4 are −0.68 and −1.48, respectively, suggesting that the main reasons for natives leaving their neighborhoods are related to family and housing.[18] Although the coefficients are largest for housing-related migration, the effects are largest for family-related migration, considering the smaller mean values of family-related migration. This implies that when there is a change in family composition, such as a marriage, families are unlikely to move into immigrant communities. Migration for other reasons, such as education, is not significantly affected by the increased presence of immigrants, as shown in Columns 5 and 6.

18 Examples of these family and housing-related migrations from the moving-in reports include marriage or purchase of property.

TABLE 9 — INTERNAL MIGRATION OF NATIVES (2SLS)

	(1) All	(2) Reason: Job	(3) Reason: Family	(4) Reason: Housing	(5) Reason: Education	(6) Reason: All Others
Panel A: Net-Migration						
$\Delta I_i/L_{i,2006}$	−0.622**	1.235**	−0.680***	−1.484**	0.080	0.228
	(0.267)	(0.572)	(0.261)	(0.599)	(0.105)	(0.265)
Mean of Outcome	−0.068	0.006	−0.036	−0.302	0.011	−0.019
Panel B: In-Migration						
$\Delta I_i/L_{i,2006}$	−0.837	1.581*	−0.467***	−2.242***	0.048	0.244
	(0.807)	(0.842)	(0.108)	(0.707)	(0.122)	(0.326)
Mean of Outcome	1.560	0. 422	0. 230	0. 597	0. 048	0.261
Panel C: Out-Migration						
$\Delta I_i/L_{i,2006}$	−0.215	0.346	0.213	−0.758***	−0.031	0.015
	(0.731)	(0.307)	(0.208)	(0.220)	(0.023)	(0.136)
Mean of Outcome	1.627	0.416	0.267	0.627	0.037	0.280
First-Stage *F* (on Excluded IV)	17.149	17.149	17.149	17.149	17.149	17.149
Observations	418	418	418	418	418	418

Notes: The dependent variable is the net migration of natives between 2006 and 2015, relative to the total population in 2006. The explanatory variable is the change in the number of immigrants between 2006 and 2015, relative to the total population in 2006. The robust standard errors are in parentheses. All regressions are weighted by the total population in 2006.

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

In Panel B and C of Table 9, we decompose the net migration of natives into in- and out-migration to examine which types of migration drive the natives' avoidance of immigrant communities. From Columns 2 through 4 of Panel B, we see that most of the effects are driven by the reduced in-migration of natives to immigrant communities. The out-migration of natives is usually insignificant, except in the case of housing-related migration, as shown in Column 4.

To further look for heterogeneity across natives, we examine whether natives with different individual characteristics respond differently to an increase in immigrants in their neighborhoods. As the SIM data provides the ages and household types of natives, we can classify the migration of natives based on age and household type, along with their reasons for migration.

Table 10 explains how natives of different age groups are affected by an increase in immigrants. Each outcome variable is standardized by the total population in the initial year (2006). In Panel A, we first examine job-related migration, which shows only positive and significant estimates in Table 9. We find that young people (aged 19–34) are mostly affected by the inflow of immigrants, as shown in Column 2. That is, the increase in jobs due to immigration is mainly focused on younger workers. Note that we find no effect on the group aged 0 to 18, shown in Column 1. This result may be viewed as a placebo test, because children are less likely to participate in the labor market.

Panel B of Table 10 focuses on migrations due to family- and housing-related reasons, which show significantly negative estimates. We class these two reasons for migration as "non-job-related reasons." In terms of the non-job-related migration of natives, all age groups significantly out-migrate from their neighborhoods in response to the increased presence of immigrants, while there are some differences in the magnitudes of these out-migrations among various age groups. Considering the mean values of the outcomes, the group aged 0 to 18 responds most significantly, which implies that families with children are less likely to in-migrate to immigrant areas.

TABLE 10 — MIGRATION OF NATIVES BY AGE GROUPS AND REASONS (2SLS)

	(1) Aged 0–18	(2) Aged 19–34	(3) Aged 35–54	(4) Aged 54+
Panel A: Job-Related Reasons				
$\Delta I_i/L_{i,2006}$	0.043	0.921**	0.223*	0.048
	(0.044)	(0.411)	(0.120)	(0.034)
Mean of Outcome	−0.003	0.021	−0.079	-0.038
Panel B: Non-Job-Related Reasons				
$\Delta I_i/L_{i,2006}$	−0.361***	−0.894**	−0.662***	−0.248***
	(0.131)	(0.384)	(0.237)	(0.091)
Mean of Outcome	−0.008	−0.026	−0.018	−0.014
First-Stage *F* (on Excluded IV)	17.149	17.149	17.149	17.149
Observations	418	418	418	418

Notes: The dependent variable is the net migration of natives between 2006 and 2015, relative to the total population in 2006. The explanatory variable is the change in the number of immigrants between 2006 and 2015, relative to the total population in 2006. The robust standard errors are in parentheses. All regressions are weighted by the total population in 2006.

***P < 0.01, **P < 0.05, *P < 0.1

In Table 11, we also classify natives into four different types of households: married couples with children, married couples without children, and single households (i.e., of one man or one woman). Each outcome variable is standardized by the total population in the initial year (2006). In Panel A, for the job-related migration of natives, we find that the in-migrations of natives mainly involve single households (Columns 3 and 4). These results are consistent with the results in Table

10, which indicate that young natives are more likely to in-migrate for jobs to areas that have seen a large increase in the number of immigrants.

In Panel B, we examine whether there are differences in native flight across households. For example, certain types of households—such as families with children or single women—may be more reluctant to live in neighborhoods with a large immigrant population. Comparing Columns 1 and 2, we find that families with children respond slightly more negatively to immigration than do families without children. Considering that families with children are less likely to migrate for non-job-related reasons, families with children may avoid immigrant communities more than do families without children. In Columns 3 and 4, the crowding-out effect of immigration is shown to be stronger for single men than it is for single women. However, these differences in estimates are relatively small and not significantly different.

TABLE 11 — MIGRATION OF NATIVES BY HOUSEHOLD TYPE AND REASON FOR MIGRATION (2SLS)

	(1) Families with Children	(2) Families without Children	(3) Single Women	(4) Single Men
Panel A: Job-Related Reasons				
$\Delta I_i / L_{i,2006}$	0.028	0.041	0.447**	0.610**
	(0.028)	(0.027)	(0.200)	(0.279)
Mean of Outcome	−0.003	−0.002	0.015	0.007
Panel B: Non-Job-Related Reasons				
$\Delta I_i / L_{i,2006}$	−0.223***	−0.165**	−0.478**	−0.577**
	(0.080)	(0065)	(0.189)	(0.246)
Mean of Outcome	−0.007	−0.009	−0.011	−0.010
First-Stage *F* (on Excluded IV)	17.149	17.149	17.149	17.149
Observations	418	418	418	418

Notes: The dependent variable is the net migration of natives between 2006 and 2015, relative to the total population in 2006. The explanatory variable is the change in the number of immigrants between 2006 and 2015, relative to the total population in 2006. The robust standard errors are in parentheses. All regressions are weighted by the total population in 2006.

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

A comparison of our results to those reported in previous literature related to natives' responses to immigration will be of value. Saiz and Wachter (2011), for instance, found that natives avoid immigrant areas due to the slower property value appreciation, arguing that this more gradual appreciation is due to the relatively lower socio-economic status of immigrants rather than to their foreignness, per se. Other studies (e.g., Betts and Fairlie, 2003; Cascio and Lewis, 2012) have focused on the role of native demand for public schools, and their studies showed that natives tend to switch to a private school upon a large inflow of immigrants.

Our results confirm that family-related migration is one of the main reasons for native flight, but they also provide other potential reasons. First, as shown in

Table 9, natives may leave their neighborhoods for housing-related reasons. Second, we find that the reasons for native flight have little correlation to labor market opportunities. Although this is partly due to the fact that we leverage neighborhood-level variations, rather than variations at the level of the local labor market, we find that some natives—young workers in particular—may even be attracted to neighborhoods with a high concentration of immigrants for job-related reasons. Last, we also rule out the possibility that racial or language issues play a role in native flight, as most immigrants in South Korea are ethnic Koreans.

V. Robustness Checks

Despite various empirical specifications and several exercises, including pre-trend tests and heterogeneous responses, our results may still be influenced by unobserved regional characteristics, unobserved outliers, or spurious correlations. To alleviate these concerns, we provide several alternative specifications to test the robustness of the main results.

Our first concern is that an increase in immigration is highly concentrated in certain areas or neighborhoods, as described in Figure 3, which means that our results could be strongly influenced by the results from these specific areas. To test this possibility, in Column 1 of Table 12, we first add 25 Gu fixed effects instead of the 11 school-district fixed effects tested previously. This means we use within-Gu variations, removing Gu-specific pre-trends. Even with this highly demanding specification, the estimates are similar to those in Table 9 and display marginally sufficient first-stage power. Similarly, in Column 2, we exclude the two Gus in which the largest increase in immigrants took place during the study period—Geumcheon and Yeongdeungpo—to check whether our results may be inordinately affected by these areas. In doing this, the estimate for the non-job-related migration of natives is found to be slightly more negative, suggesting that the crowding-out effect exists in the other neighborhoods as well.

In Column 3, we test whether our results are merely a continuation of the pre-trends by directly controlling for the change in natives between 2000 and 2006, which we use as an outcome for the falsification test in Table 7. Reassuringly, the estimate changes very little. Column 4 omits the neighborhoods with the smallest populations (i.e., the bottom 5 percent) to see if the effects are highly influenced by the smaller neighborhoods. Although the estimated coefficients become slightly smaller, the estimates are still strongly significant. In Column 5, we exclude the 5 observations with the highest values in the IV used in estimating, to see if the results are robust. In this case, the estimates become greater and more significant. Finally, in Column 6, we control for the level and the square of the population in 2006, because it is clear from the analysis that this variable is important. Reassuringly, the results are similar and highly significant.

TABLE 12 — ROBUSTNESS CHECKS (2SLS)

	(1) Control: Gu Fixed Effects	(2) Excluding Geumcheon & Yeongdeungpo	(3) Control: Pre-Trend (2000–2006)	(4) Excluding Places with Smallest Populations	(5) Excluding Places with Largest IVs	(6) Control: Population and Square of the Population
Panel A: Job-Related Reasons						
$\Delta I_i/L_{i,2006}$	1.331*	1.687*	1.238**	1.239**	2.290***	1.244**
	(0.788)	(0.888)	(0.569)	(0.579)	(0.838)	(0.572)
Panel B: Non-Job-Related Reasons						
$\Delta I_i/L_{i,2006}$	−2.408**	−2.962**	−2.160***	−1.944**	−4.002***	−2.111***
	(1.058)	(1.394)	(0.822)	(0.758)	(1.109)	(0.794)
First-Stage F (on Excluded IV)	10.962	19.138	17.368	16.151	19.143	17.179
Observations	418	418	418	397	413	418

Notes: The dependent variable is the change in the native population between 2006 and 2015, relative to the total population in 2006. The explanatory variable is the change in the number of immigrants between 2006 and 2015, relative to the total population in 2006. The robust standard errors are in parentheses. All regressions are weighted by the total population in 2006.

***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

Overall, the estimates in Table 10 are robust across the different specifications, confirming that natives tend to avoid neighborhoods with an increased number of immigrants.

VI. Conclusion

This study examined native South Koreans' responses to an increased inflow of immigrants and their patterns of relocation to different neighborhoods. The analysis used an administrative dataset including 418 hangjungdongs, or neighborhoods, within Seoul, South Korea, from 2006 to 2015. We extracted plausibly exogenous variations from the endogenous location choices of immigrants, using the expansion of the F-4 visa system and the past settlement patterns of ethnic groups.

Our results reveal that the arrival of 10 immigrants to a neighborhood leads to the departure of approximately 6 natives from the same neighborhood. This crowding-out effect is not accompanied by a decrease in neighborhood value, showing that a negative compensating differential exists. We further investigated why natives tend to leave neighborhoods with an increasing number of immigrants by studying their reasons for moving. We found that in most cases, native flight is due to family- or housing-related reasons. However, our results also show that a small number of natives move into immigrant communities for job-related reasons. Our overall results suggest that areas with a high concentration of immigrants are less desirable to natives due to the perceived socio-economic status of immigrants being relatively low.

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APPENDIX A

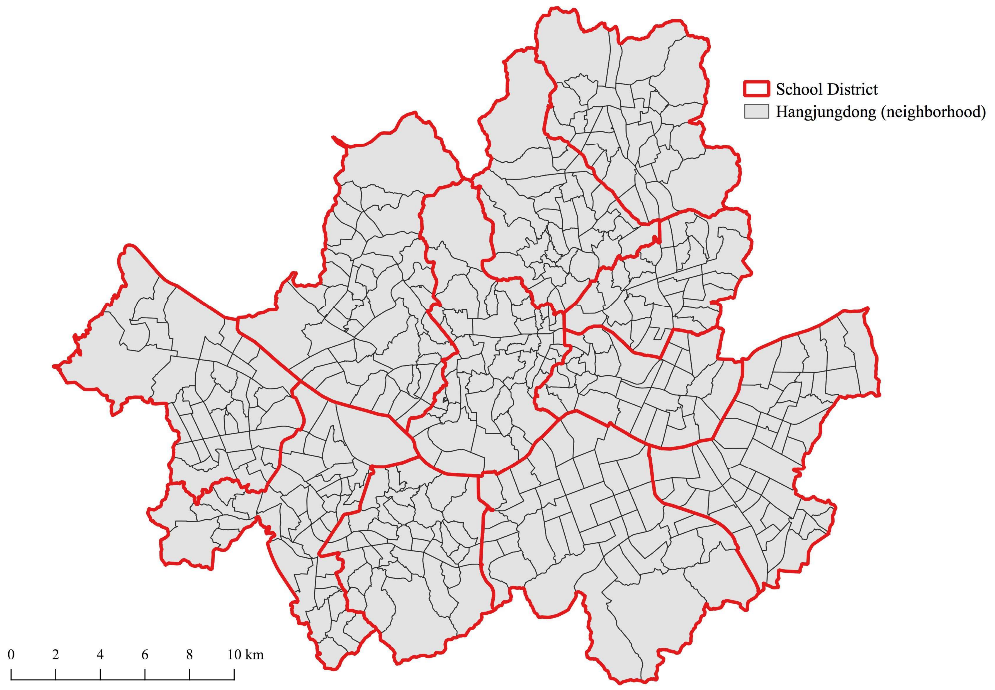

FIGURE A-1: SCHOOL DISTRICT MAP