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Fighting the wrong battle: the effects of immigrant inflows on domestic migration of natives versus settled immigrants in the USA

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Abstract

Using a multilevel model to account for individual and state levels of analysis, we examined whether native-born workers and settled immigrants differed in their migratory responses to recent immigration. We investigated the disparate impact of recent immigration across varying macroeconomic situations: before the recession (2006), during the recession (2009), and after the recession (2012). Our empirical results revealed that as immigration increased, settled immigrants showed a tendency to migrate outside of their states, while native-born workers were more likely to remain. Despite its significant impact in 2006 and 2009, the share of recent immigrants became statistically insignificant in 2012. Regardless of macroeconomic situation, the probability of out-migration for native-born workers was found to be negatively associated with recent immigrant share. This finding challenges the existing notion that new immigration creates competition with native-born workers in the labor market and causes unnecessary domestic migration.

1 Introduction

There are a wide variety of demographic, social, and economic effects related to immigration. Immigrants tend to be geographically concentrated in a few specific regions, but the impact of this concentration often spreads to other regions through a process known as domestic migration (Frey 1996). Thus, domestic migratory responses to immigration serve as key factors in determining the regional impact of immigration. When exploring this regional impact, it is useful to investigate the direct and indirect domestic migration triggered by such

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immigration. Smith and Edmonston (1997, 1998) suggested that changes in population, employment, and wages were among the regional characteristics most affected by immigration. Considering recent changes in immigration policy, the impact of immigration has proven to be a crucial topic of research, due to its direct and indirect effect on local labor markets.

Previous studies addressing domestic migration due to job competition with immigrants have focused on native-born workers with lower educational backgrounds (Walker et al. 1992; Frey 1995; White and Liang 1998; Camarota 2006; Kochhar 2006). These studies tended to highlight the negative impacts of immigration, such as the unnecessary migration of less educated native-born workers during the 1980s and 1990s, at a time when immigration soared. Back then, the effect of increased immigration on settled immigrants was not addressed because local economies did not yet possess the capacity to create or produce jobs for new immigrants. As a result, new immigrants competed with native-born workers to obtain employment in the labor market.

Recently, however, the socioeconomic conditions related to immigration have changed. Compared to employment prospects during the past economic boom, job opportunities in the present have greatly decreased due to the instability caused by several economic crises (Elsby et al. 2010). In addition, due to industrial restructuring and the constant inflow of immigrants, it is unlikely that immigrants will replace unskilled, low-wage native-born workers (Martin 2009). At the same time, because of the limited job prospects available in sectors where immigrants typically work, recent immigrants are more likely to compete for job opportunities with settled immigrants than with native-born workers (Gutiérrez-Portilla et al. 2018). Hence, in order to avoid such competition, settled immigrants may feel inclined to relocate.

The objective of this study was to investigate the impact of recent immigrants on domestic (interstate) migration. More specifically, we sought to determine whether native-born workers and settled immigrants differed in their migratory responses to immigration. Additionally, since the impact of immigration may vary based on specific economic conditions, we analyzed the degree of impact at three different time points: before the recession (2006), during the recession (2009), and after the recession (2012).

Of course, any examination of these arguments requires appropriate research methods and data. Migration comprises a mixture of individual beliefs and contextual characteristics related to origin and destination (Kulu and Billari 2004). In order to empirically analyze the migratory response to immigration, we accounted for personal characteristics at the individual level, as well as overall increases in immigration at the state level. For instance, if increased immigration in a particular state influences its rate of domestic out-migration, this effect may also stem from the specific characteristics of the individuals involved. To reflect this nested analysis structure, a multilevel model was used in this study. Using the American Community Survey (ACS)'s Public Use Microdata Sample (PUMS), we estimated multilevel logit models with controls at two levels—the individual and the state—to assess the impact of immigration on the probability

of domestic out-migration between states. The hierarchically structured PUMS data accounted for both individual and state characteristics.

2 Effect of immigrants on domestic migration

This study sought to address how immigrants affect domestic (interstate) migration within the USA. Two representative views characterize the linkage between immigration inflow and domestic migration. The first suggests that the concentration of immigration inflow has accelerated, leading to the selective out-migration of native-born workers. This 'displacement' or 'substitution' hypothesis argues that domestic migration occurs when native-born workers with low-level skills and education are inclined to move to avoid competition with immigrant workers in the local labor market (Frey et al. 1996; Frey and Liaw 1998; Vázquez et al. 2011). In particular, job competition emerges when immigrants offer similar skillsets as those of native-born workers. As a result, native-born workers may receive lower wages, lose their jobs, and decide to move (White and Liang 1998). Moreover, in case of the metropolitan area, migration of natives and deflation of housing prices was observed due to the negative view of the increase in immigrants density (Saiz and Wachter 2011). That is to say, the inflow of immigrants may affect the rise of domestic migration through various mechanisms.

The second approach, also known as the complementary view, argues that the selective out-migration of native-born workers stems from industrial restructuring, not the inflow of immigrant workers (Walker et al. 1992). Peri (2007) showed that despite the state of California's rapid increase in immigration from the 1990s to the early 2000s, no significant association was found between inflow of immigrants and out-migration of native-born workers with similar educational backgrounds. In fact, the wages of native-born workers even increased during that period, implying that the immigrants were complements rather than competitors to native-born workers. Moreover, since immigrants often faced limitations in language, education, and skills (White and Liang 1998), native workers often benefited by specializing in more productive fields, while immigrants engaged primarily in simple low-skilled work.

Based on previous studies, no consensus exists concerning the significant effect of immigration on domestic migration. Some studies suggest that immigration may affect domestic out-migration through job competition between immigrants and native-born workers (White and Liang 1998; Borjas 2003, 2006; Frey et al. 2005; Camarota 2006; Sum et al. 2006; Ali et al. 2012), while other studies show the impact of immigration to be negligible or insignificant (Kritz and Gurak 2001; Linton 2002; Kochhar 2006; Ottaviano and Peri 2006; Card 2007; Peri 2007). Differences in the analytic methods and periods, as well as the heterogeneity of macroeconomic conditions, have led to this inconsistency in empirical results.

Most previous studies have not addressed the effect of new immigrants on settled immigrants, emphasizing instead the impact of immigration inflow on domestic migration of native-born workers. However, as mentioned in the Introduction, recent immigrants may face more competition with settled immigrants than

with native-born workers (Gutiérrez-Portilla et al. 2018). According to Frey and Liaw (1998), immigrants tend to be strongly influenced by social and ethnic networks, while domestic migrants tend to be sensitive to labor market conditions. As a result, new immigrants tend to migrate to areas where many immigrants have already settled, since they receive access to more social and cultural advantages in such areas. Moreover, according to Card (1990), if settled immigrants in certain ethnicity actively participated in the local labor market, immigrants with same ethnicity could find job positions relatively easily because of less cultural heterogeneity. As a result, further migration could hardly occur due to the increase of wage, unemployment rate, and job competition by the rapid inflow of immigrants. However, in terms of industrial structure, this result might be considered as a reflection of past conditions that immigrants could find a job position easily which labor-intensive industries were still growing. With the advancement of industrial structure in recent years, relatively few industries exhibit a willingness to hire immigrants with the limited communication skills, resulting in fierce job competition between new and settled immigrants in these areas. The inflow of new immigrants may thus serve as a push factor for the out-migration of settled immigrants.

The impact of low-skilled immigration in the labor market has been mitigated by industrial restructuring (Card and DiNardo 2000). Because the share of low-skilled labor-intensive industries has decreased, the demand for native-born workers with lower educational levels—who had, in the past, been replaced by immigrants with lower wages—has also declined. As a result, both new and settled immigrants face competition with each other for the limited number of jobs available to them. In fact, the impact of new immigration may be more serious for settled immigrants than for native-born workers.

In both aforementioned perspectives, the influence of immigration is highly subject to macroeconomic conditions. Of course, this impact on domestic migration tends to be small during periods of economic boom that offer nearly full employment, such as the late 1990s. Under these scenarios, the large-scale inflow of immigrants may even lead to in-migration of native-born workers due to the derived economic demand of immigrant concentrations and the low cost of services provided by immigrants (Saks and Wozniak 2011). However, during periods of recession, overall rates of migration tend to decrease since fewer economic benefits are expected (Molloy et al. 2011, 2017). While migration of certain competitive native-born workers may continue, immigrants tend to be frozen in place during times of economic upheaval (Molloy et al. 2011; Karahan and Rhee 2013; Johnson et al. 2017).

Based on this discussion, our analysis sought to determine whether native-born workers and settled immigrants (foreign-born) differed in their migratory responses to recent immigration trends, in addition to investigating the varying impact of immigration based on different macroeconomic situations. Thus, we tested the following hypotheses:

H1 The impact of recent immigration on domestic migration may differ between native-born workers and settled immigrants.

H2 The impact of recent immigration on domestic migration may change in terms of its magnitude, direction, or statistical significance, based on specific macroeconomic situations.

In order to test these hypotheses, we organized large-scale data into a multilevel structure that accounted for the individual and the state level. Next, we described the structure of our data and the specifications for our multilevel model.

3 Research methods

3.1 Data

To analyze the linkage between recent immigrants on domestic migration of native-born workers and settled immigrants according to selected macroeconomic conditions, we used 1-year estimate data from the American Community Survey (ACS)'s Public Use Microdata Sample from different 3 years: 2006 (before the recession) 2009 (during the recession), and 2012 (after the recession). The one-year estimates provided annual data that replaced the long-form characteristics data from the decennial census while retaining all of its variables. The key difference lay in its inclusion of place of residence prior to survey year—while the decennial census had collected data on place of residence 5 years prior, the ACS recorded data on the place of residence 1 year prior. In order to examine the effects of macroeconomic situations more efficiently, the ACS proved to be more appropriate than the decennial census. Although certain studies used the Current Population Survey (CPS) to explore one-year migration, we believed that the CPS did not utilize large enough samples to analyze small subgroups such as immigrants, in addition to neglecting certain variables needed for this study.

We tested our hypotheses by analyzing the data at two conceptual levels: the individual and the state. We nested individual characteristics within state characteristics and analyzed the domestic migration of native-born and foreign-born individuals aged 25–64, restricting our sample to those residing or migrating within the states. We regarded those residing in the same house or moving within the same state as non-movers. The process yielded a sample of approximately 1.46–1.49 million individuals nested in 51 states at different time points.

3.2 Measures

Level 1: Individuals In our model, the dependent variable accounted for whether individuals migrated or not. If an individual's current state of residence differed from the state of residence 1 year prior, that individual was defined as a migrant, as measured by a binary variable for out-migrants. We included a binary variable for settled immigrants, who were the foreign-born and the main subject of this study. Specifically, as described in Level 2 measures, recent immigrants were defined as people in previous 5 years data for each analysis year. And the settled immigrants

were defined as people whose year of entry exceeds the recent 5 years. For that reason, settled immigrants are clearly distinguished from recent immigrants. In order to control for other individual characteristics, we included binary variables to account for whether the individual male or female, married or single, living in an owned or rented house, and living with school age (5–17) children or not. Each characteristic mentioned first served as the reference category. We also included three age dummy variables (ages 25–34, 35–44, and 45–54, where ages 55–64 served as the reference category) and four dummy variables based on race and ethnicity (White, Hispanic/Latino,[1] Black, Asian/Pacific Islander, etc., where White served as the reference category). Additionally, we used two dummy variables to capture differences in educational background (less than high school, high school or some college, and Bachelor's degree or above, with the former serving as the reference category).

Level 2: States At the state level, our independent variable of primary interest was the ratio of recent immigrants (those who had moved to the USA within the previous 5 years) to the total state population. In order to control for the attributes of local labor markets, unemployment rates and mean annual wages in states were included as explanatory variables. To account for industrial structure characteristics, we included industrial composition, as measured by the percentage those working in manufacturing among all workers. Additionally, we used the median housing value of each state to account for the condition of the local housing market. We also included total state populations to control for their differing sizes.

As shown in Table 1, the descriptive statistics at each level indicate that approximately 2% of individuals in our sample migrated between states during the years of our study. Approximately 14–15% of the sample were identified as settled immigrants. At the state level, the mean percentage of recent immigrants in the 51 states was 0.41–0.42% of the total state population. Compared to the variables at the individual level, the state level variables such as population size and manufacturing share showed greater variation over time. Interestingly, the average state populations increased while the shares of recent immigrants remained constant, suggesting an increase in the number of new immigrants.

3.3 Statistical models

Depending on its particular research approach, each previous study addressing the impact of immigration on domestic migration can be roughly classified as either macro or micro. The former typically addresses the linkage between aggregated migration flow in metropolitan areas/states and population redistribution through migration (Walker et al. 1992; Frey and Liaw 1998; Linton 2002; Camarota 2006; Kochhar 2006; Mitze and Schmidt 2015). Macro research includes broad structures and trends related to migration but fails to explain individual migration mechanisms

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[1] Hispanic/Latino is not strictly race but ethnicity. In order to control the impact of the Hispanic/Latino group, which is expected to have the greatest impact among the ethnicities of immigrants, they were basically divided according to race, and Hispanic classification of ACS data was additionally applied to make it into separate variable.

Table 1 Descriptive statistics for variables used in the analysis (by year)

	Mean			Standard deviation		
	2006	2009	2012	2006	2009	2012
Individual level						
Out-migration (*move*)	0.02	0.02	0.02	0.15	0.14	0.14
Settled immigrants (*foreign*)	0.14	0.15	0.15	0.35	0.35	0.36
Age25–34 (*ag2534*)	0.2	0.2	0.2	0.4	0.4	0.4
Age35–44 (*ag3544*)	0.26	0.24	0.23	0.44	0.43	0.42
Age45–54 (*ag4554*)	0.3	0.3	0.29	0.46	0.46	0.45
Male (*male*)	0.48	0.52	0.52	0.5	0.5	0.5
Hisp (*hisp*)	0.11	0.12	0.13	0.31	0.32	0.33
Black (*black*)	0.09	0.09	0.1	0.28	0.29	0.3
Asia and Islander (*asia*)	0.05	0.05	0.05	0.21	0.22	0.22
Other (*other*)	0.02	0.02	0.02	0.13	0.14	0.16
Married (*married*)	0.68	0.66	0.64	0.47	0.47	0.48
High school and some college (*hssc*)	0.58	0.58	0.57	0.49	0.49	0.49
Bachelor's degree or above (*baabove*)	0.31	0.32	0.32	0.46	0.47	0.47
School age children (*children*)	0.32	0.31	0.29	0.47	0.46	0.45
Owned housing (*owned*)	0.79	0.77	0.74	0.41	0.42	0.44
State level						
Ratio of recent immigrants (*immig*, %)	0.42	0.42	0.41	0.04	0.04	0.04
Population size (*pop*, million)	5.87	6.02	6.16	6.64	6.78	6.97
Manufacturing share (*manu*, %)	8.11	7.03	6.95	3.27	2.73	2.82
Unemployment rate (*unemp*, %)	6.09	9.10	8.54	1.35	2.06	1.99
Mean annual wage (*wage*, 1k dollars)	37,759	41,893	44,333	5625	6469	6842
Median housing value (*mvhouse*, 0.1 million)	2.01	2.01	1.91	1.08	0.92	0.85
	2006		2009		2012	
Individual level (number of observations)	1,460,811		1,490,236		1,482,014	
State level (number of observations)	51		51		51	

(Gardner 1981). Micro research focuses on the individual migration decision-making process (White and Liang 1998; Borjas 2003; Card and DiNardo 2000; Kritz and Gurak 2001; Hempstead 2003), though it tends not to include spatial concepts, thereby opening the potential for biased empirical results (Cushing and Poot 2004).

Migration is the result of a combination of individual needs and contextual characteristics related to origin and destination (Kulu and Billari 2004). Studies on migration tend to prefer multilevel structures. Our data aligned well with a nested structure, with individuals nested within states. Statistically, analyzing the nested structure data through general regression analysis, it threatened the statistical assumptions of conventional OLS analysis such as independent and identically distribution of the error term. Specifically, in this study, the individuals in the same states are more likely to indicate correlated residuals, which

might underestimate the standard errors. Using the multilevel approach allows us to relax the independent assumption and delivers more efficient estimates with conservative standard errors (Goldstein 2003). Therefore, we used a two-level logistic model to assess the effect of immigrants on domestic out-migration between states. This approach yielded the following advantages. First, the multilevel model permitted us to control for effects from different level variables, avoiding biased estimates arising from nested data structures (Guo and Zhao 2000; Raudenbush and Bryk 2002). Second, its flexibility allowed us to specify cross-level interactions and estimate the effect of each individual's nationality on migration, depending on the volume of recent immigration in the state.

The individual-level (Level 1) model predicted the migration of each individual i in state j. We included a dichotomous measure of settled immigrants (*foreign* = 1) as a nationality variable with other control variables. We then introduced an interaction term between nationality (settled immigrants) and dummy variables for educational background, in order to examine whether the migration of settled immigrants depended on their education. According to Frey (1995), since education correlates strongly with job skills, even when settled immigrants reside in the same state, there may be differences among them in their migratory responses to large-scale immigration, depending on their education. Formally, the individual level logit model was expressed in the following manner:

Individual level (Level 1)

$$\eta_{ij} = \log \left(\frac{P_{ij}}{1 - P_{ij}} \right) = \beta_{0j} + \beta_{1j} foreign_{ij} + \beta_{2j} hssc_{ij} + \beta_{3j} baabove_{ij}$$
$$+ \beta_{4j}(foreign * hssc)_{ij} + \beta_{5j}(foreign * baabove)_{ij} + \beta_{6j} X_{1ij} \dots + \beta_{6+mj} X_{mij} + u_{ij}$$

When y_{ij} is a binary dependent variable (migration) from individual i in state j, the logit link function is expressed as $\eta_{ij} = \log \left(\frac{P_{ij}}{1 - P_{ij}} \right)$, and the probability of outcome is $\text{Prob}(y_{ij} = 1) = P_{ij}$ and $\text{Prob}(y_{ij} = 0) = 1 - P_{ij}$.

Because all independent variables in the individual level model were dummies, β_{0j}, the intercept for state j, served as the log odds of migration for individual i in state j, with reference cases of dummy variables such as native-born, female, white, and unmarried. Next, due to the interactions with the variables for educational background, the effect of settled immigrant identity on the log odds of migration for individual i in state j can be denoted by $\beta_{1j} + \beta_{4j} * hssc + \beta_{5j} * baabove$. If β_{1j} was positive and significant, settled immigrants without high school diplomas were more likely than native-born workers to move out of the state. Additionally, β_{4j} and β_{5j} were the effects of interaction between a dummy variable for settled immigrant identity (*foreign*) and educational background (*hssc* and *baabove*). For example, both β_{1j} and β_{4j} were positive and significant, settled immigrants who graduated high school or attended some college were more likely than settled immigrants without high school diplomas to migrate out of the state. Moreover, β_{2j}, β_{3j}, and X_{mij} denoted the M control variables including the effects of educational background for individual levels. Finally, u_{ij} was the random effect at the individual level.

In the state level (Level 2) model, we set the Level 1 intercept (β_{0j}), the effect of *foreign* (β_{1j}), and the two interaction terms with *foreign* and educational background (β_{4j} and β_{5j}) as random across the states. We estimated these coefficients as a function of recent immigrant share and other state-level control variables, such as population size, unemployment rate, mean annual wage, manufacturing share, and median housing value. The state level (Level 2) model was expressed in the following manner:

State level (Level 2)

$$\beta_{0j} = \gamma_{00} + \gamma_{01}imming_j + \gamma_{02}pop_j + \gamma_{03}unemp_j + \gamma_{04}wage_j + \gamma_{05}manu_j + \gamma_{06}mvhous_j + \varepsilon_{0j}$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}imming_j + \gamma_{12}pop_j + \gamma_{13}unemp_j + \gamma_{14}wage_j + \gamma_{15}manu_j + \gamma_{16}mvhous_j + \varepsilon_{1j}$$

$$\beta_{4j} = \gamma_{40} + \gamma_{41}imming_j + \gamma_{42}pop_j + \gamma_{43}unemp_j + \gamma_{44}wage_j + \gamma_{45}manu_j + \gamma_{46}mvhous_j + \varepsilon_{4j}$$

$$\beta_{5j} = \gamma_{50} + \gamma_{51}imming_j + \gamma_{52}pop_j + \gamma_{53}unemp_j + \gamma_{54}wage_j + \gamma_{55}manu_j + \gamma_{56}mvhous_j + \varepsilon_{5j}$$

γ_{00} was the intercept for the log odds of migration for individuals in the state-level model. γ_{01} was the effect of the ratio of recent immigrants on β_{0j}. Because the effect of settled immigrant identity is $\beta_{1j} + \beta_{4j} * hssc + \beta_{5j} * baabove$, the effect of the ratio of recent migration on the log odds of migration for settled immigrants can be denoted by $\gamma_{01} + \gamma_{11} + \gamma_{41}hssc + \gamma_{51}baabove_j$. Specifically, $\gamma_{01} + \gamma_{11}$ represented the effect of the ratio of recent immigrants on the log odds of migration of settled immigrants without high school diplomas. Additionally, $\gamma_{01} + \gamma_{11} + \gamma_{41}$ represented the effects of recent immigrants on the migration of settled immigrants with high school graduates and $\gamma_{01} + \gamma_{11} + \gamma_{51}$, denoted the effects on the migration of settled immigrants with Bachelor's degrees. For instance, if the net effect of $\gamma_{01}+\gamma_{11}$ was positive, settled immigrants without high school diplomas were more likely to relocate from states with larger recent immigrant share. Similarly, $\gamma_{01} + \gamma_{11} + \gamma_{41}$ and $\gamma_{01} + \gamma_{11} + \gamma_{51}$ allowed us to examine whether the impact of recent immigration depended on the education of settled immigrants.

In order to compare the disparate impact of immigration across varying macroeconomic situations, the multilevel model accounted for three different time points: before the recession (2006), during the recession (2009), and after the recession (2012).

4 Results

4.1 Effects of the main independent variables

Since this study predicted that the influence of recent immigration on domestic migration may vary between native-born workers and settled immigrants, the independent variables of primary interest were a dummy variable (*foreign*) for settled immigrants in Level 1 and the ratio of recent immigrants to the total population in Level 2. Table 2 presents the estimated results of these key variables and their interaction terms in the multilevel model. First of all, the ICC(Intra-Class Correlation) of all three models are similarly shows 0.102–0.104, it implies that about 10% of

Table 2 Estimation results for key variables

	Log odds of migration		
	Before-recession (2006)	Recession (2009)	After-recession (2012)
ICC (intra-class correlation)	0.1037	0.1039	0.1018
Intercept (β_{0j})			
Intercept (γ_{00})	− 3.894***	− 4.092***	− 4.121***
Ratio of recent immigrant (γ_{01})	− 2.835**	− 3.021**	− 1.743
Population size (γ_{02})	− 0.027***	− 0.034***	− 0.029***
Unemployment rate (γ_{03})	0.096**	0.024**	0.012
Mean annual wage (γ_{04})	− 0.008	0.007	0.008
Manufacturing share (γ_{05})	− 0.026*	− 0.010	− 0.017
Median housing value (γ_{06})	− 0.027	− 0.046	− 0.061
Settled immigrants (β_{1j})			
Intercept (γ_{10})	0.230**	0.454***	0.451***
Ratio of recent immigrant (γ_{11})	5.939***	2.829*	− 3.648
Population size (γ_{12})	0.014	− 0.004	− 0.043***
Unemployment rate (γ_{13})	0.120*	− 0.029	− 0.037
Mean annual wage (γ_{14})	− 0.003	0.050***	0.060**
Manufacturing share (γ_{15})	− 0.029	− 0.012*	0.067**
Median housing value (γ_{16})	− 0.170**	− 0.450***	− 0.512***
Settled immigrants * high school and some college (β_{4j})			
Intercept (γ_{40})	0.004	− 0.263***	− 0.245***
Ratio of recent immigrant (γ_{41})	1.163	− 1.639	9.816***
Population size (γ_{42})	− 0.015**	− 0.011**	0.035***
Unemployment rate (γ_{43})	0.070*	− 0.020	0.111**
Mean annual wage (γ_{44})	− 0.005	− 0.020**	− 0.048***
Manufacturing share (γ_{45})	− 0.030	0.004	− 0.099***
Median housing value (γ_{46})	0.154***	0.157**	0.256**
Settled immigrants * bachelor's degree or above (β_{5j})			
Intercept (γ_{50})	0.122	− 0.131*	− 0.152*
Ratio of recent immigrant (γ_{51})	− 3.538*	− 0.648	6.396**
Population size (γ_{52})	− 0.024**	− 0.012*	0.029**
Unemployment rate (γ_{53})	− 0.205**	− 0.005	0.024
Mean annual wage (γ_{54})	0.044**	− 0.031*	− 0.040**
Manufacturing share (γ_{55})	0.090**	0.076**	0.015
Median housing value (γ_{56})	0.104	0.265**	− 0.273**

*$p < .05$; **$p < .01$; ***$p < .001$ (two-tailed tests)

total variations are explained by the state-level difference and the rest is explained by individual level difference.

In 2006, the effect of recent immigrants on migration of native-born workers (γ_{01}) was negative and significant, indicating that as more immigrants arrived, native-born workers became less likely to move out of the state. For settled immigrants with
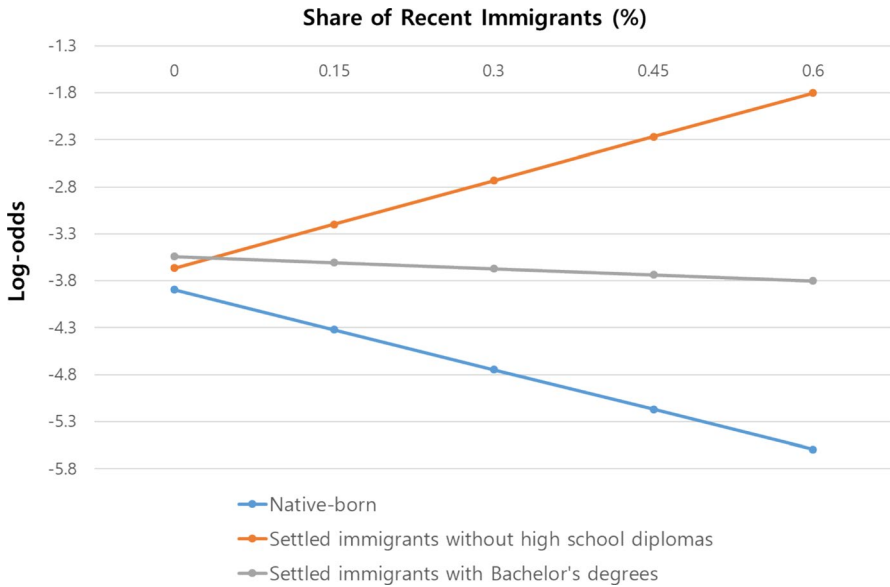
Fig. 1 Log-odds of migration between native-born and settled immigrants in 2006

less than high school diplomas in educational background, however, the net effect of recent immigrants ($\gamma_{01} + \gamma_{11}$) was significantly positive ($3.104 = -2.835 + 5.939$). Contrary to the case of native-born workers, as the inflow of new immigrants increased, settled immigrants without high school diplomas became more likely to move out of their state. These findings lend support to our first hypothesis, which predicted that the impact of recent immigration on domestic migration might differ between native-born workers and settled immigrants. Moreover, considering the estimation result for γ_{41}, we found no significant evidence that the variable of education for high school graduates among settled immigrants predicts the differential effect of recent immigration. However, although the magnitude of the effect was small, the net effect of $\gamma_{01} + \gamma_{11} + \gamma_{51}$ was significantly negative ($-0.434 = -2.835 + 5.939 + -3.538$), indicating that as more immigrants moved in, settled immigrants with Bachelor's degrees were less likely to move out of the state. Figure 1 illustrates how, when the share of recent immigration increases, the out-migration probability for settled immigrants with different educational background changes while the out-migration probability of native-born workers decreases. The slope for native-born workers indicates a gradual decrease, whereas the slope for settled immigrants without high school diplomas shows a relatively sharp increase. At the same time, the slope for settled immigrants with Bachelor's degree indicates a slight decrease.

Additionally, population size had a statistically significant negative impact on the migration of native-born workers. In terms of migration for settled immigrants, population size showed significantly negative effects for the interaction terms with educational background and the combining effect with γ_{12} for settled immigrants without high school diplomas were still negative, suggesting that settled immigrants who graduate high school were less likely to move out of their states. Although there
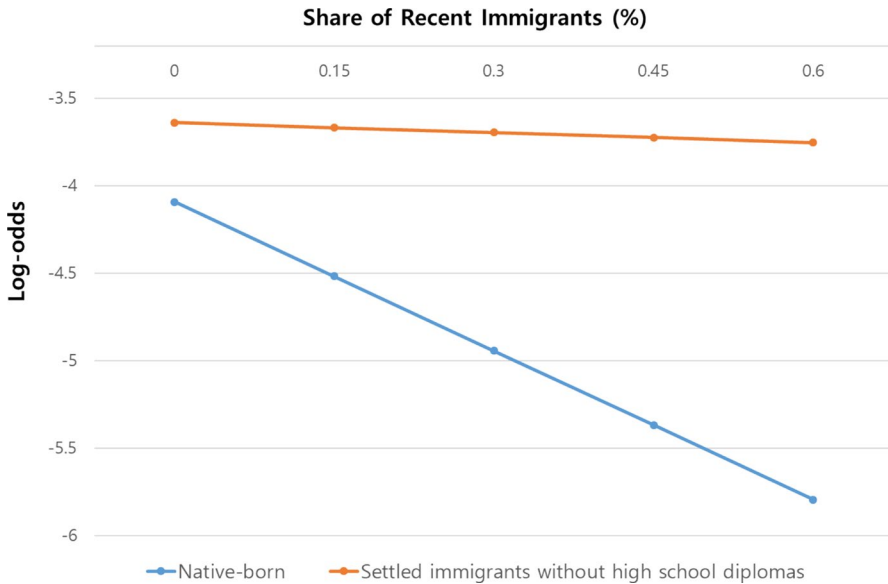
Fig. 2 Log-odds of migration between native-born and settled immigrants in 2009

was a difference in the extent of impact according to the educational background of settled immigrants, unemployment rate had a positive effect on the migration of both native-born workers and settled immigrants. The effect of wage indicated an insignificant impact in 2006.

Furthermore, the manufacturing share also showed a significant but opposite effect on the interaction terms between *foreign* and educational background. Its net effect on settled immigrants with Bachelor's degrees was significantly positive (0.035 = −0.026 + −0.029 + 0.090 = $\gamma_{05} + \gamma_{15} + \gamma_{55}$), while the net effect for those who completed high school was insignificantly negative (−0.085 = −0.026 + −0.029 + −0.030 = $\gamma_{05} + \gamma_{15} + \gamma_{45}$). Perhaps the high share of the manufacturing industry might serve as a push factor for the migration of highly educated settled immigrants.

In 2009, the share of recent immigrants retained its significant and negative impact on the migration of native-born workers, while its net effect on settled immigrants without high school diplomas was changed to negative. However, as depicted in Fig. 2, the extent of these effects between native-born workers and settled immigrants still indicated substantial gaps. Additionally, the effects on the interaction terms with educational attainments was statistically insignificant.

Additionally, the estimation results on the impact of population size were similar to those of 2006. The effect of unemployment on settled immigrants was no longer statistically significant while wages started to show a positive effect on the migration of settled immigrants, regardless of educational background. The manufacturing share had a significant positive effect on settled immigrants with Bachelor's degrees, whereas it indicated a negative effect on settled immigrants without high school diplomas. These results imply that advances in industrial structure and increases in wage might lead to stimulating the out-migration of settled immigrants.

In 2012, although the impact of recent immigration on native-born workers was no longer statistically significant, only its effects on the interaction terms between settled immigrants and educational background were statistically significant. This result is consistent with that of previous studies, which found that the probability of migration for settled immigrants was relatively lower than that of native-born workers during economic downturns (Molloy et al. 2011; Karahan and Rhee 2013). This clarified the statistical differences in the effect of recent immigration, depending on the educational background of settled immigrants. The net effects of recent immigration on settled immigrants with both levels of educational attainments were positive, indicating that educated settled immigrants were more likely to move out of state. With the recovery of macroeconomic conditions, the probability of out-migration for settled immigrants likely increases selectively based on education levels.

In summary, the impact of recent immigration on domestic migration of native-born workers and settled immigrants varied depending on the educational background of settled immigrants and macroeconomic situations. The inflow of immigrants in 2006 yielded opposed effects on the out-migration probabilities of native-born workers and settled immigrants without high school diplomas. Specifically, the share of recent immigrants was found to increase the probability of settled immigrants moving out of state, although it decreased the out-migration probability of native-born workers. However, in 2009, the inflow of immigrants had a negative effect on both native-born workers and settled immigrants at the same time, and native-born workers were more affected. Moreover, these effects were no longer significant in 2012. These findings supported our second hypothesis, which predicted that the impact of recent immigration on domestic migration might change in terms of magnitude, direction, or statistical significance, based on specific macroeconomic situations.

4.2 Effects of individual-level control variables

Table 3 presents the estimated results of control variables in the multilevel model. Compared to the estimation results of the state-level variables and their cross-level interactions, the direction and statistical significance of the estimated influences for the individual-level variables were more constant and stable during all years.

With the exception of the group aged between 45 and 54 in 2006, all age variables continued to show a positive and significant impact. Compared to the eldest age group (55–64), the probabilities of out-migration for the younger age groups (25–34; 35–44; 45–54) were relatively high. These findings supported the life course theory on migration, which argues that younger individuals who tend to experience life events such as employment, marriage, and childbirth tend to migrate more readily (Clark and Dieleman 1996; De Jong and Graefe 2008).

In addition, the effect of the gender variable (*male*) was constantly positive and significant, indicating that the out-migration propensity for male workers was higher than that of female workers during all three years. In terms of race/ethnicity, compared to the white population, the out-migration propensities of the black and Hispanic populations were relatively low. This suggests that racial minorities tend to be consistently

Table 3 Estimation results for control variables

	Log odds of migration		
	Before-recession (2006)	Recession (2009)	After-recession (2012)
Age25–34 (*ag2534*)	0.861***	0.900***	0.826***
Age35–44 (*ag3544*)	0.459***	0.518***	0.482***
Age45–54 (*ag4554*)	0.038	0.094***	0.127***
Male (*male*)	0.060***	0.053***	0.059***
Hisp (*hisp*)	− 0.276**	− 0.331***	− 0.401***
Black (*black*)	− 0.274**	− 0.422***	− 0.504***
Asia and Islander (*asia*)	− 0.013	0.002	− 0.118
Other (*other*)	0.008	− 0.119	− 0.220**
Married (*married*)	0.026	− 0.009	0.031*
High school and some college (*hssc*)	0.191***	0.263***	0.299***
Bachelor's degree or above (*baabove*)	0.690***	0.793***	0.846***
School age children (*children*)	− 0.360***	− 0.357***	− 0.404***
Owned housing (*owned*)	− 1.347***	− 1.607***	− 1.690***

*$p < .05$; **$p < .01$; ***$p < .001$ (two-tailed tests)

concentrated in certain areas. Moreover, the magnitude of the effects of race steadily increased during the recession (2009) and recovery years (2012), suggesting that the so-called "frozen in place" phenomenon (Molloy et al. 2011; Karahan and Rhee 2013) during economic recessions occurs more substantially for racial minorities such as Blacks and Hispanics. Marital status had a marginally significant (at 90% level) and positive effect in 2012, but not in 2006 or 2009. These results contradicted those of previous studies, which argued that single and widowed people tend to migrate more than married people (Newbold and Liaw 1995; White and Liang 1998).

In terms of education, the results showed that higher education levels were associated with higher out-migration probabilities. Compared to those who did not complete high school, the increase in log-odds of out-migration for those who completed college was more than twice that of high school graduates. Moreover, the difference in out-migration probability based on education level was more pronounced during the recession and recovery years. These increases in magnitude based on education imply that people with higher educational backgrounds tend to be more likely to migrate to overcome economic difficulties.

Finally, *children* and *owned* constantly and significantly yielded negative effects, such that out-migration probabilities were relatively low for people needing stable residences, such as families with school-age children or home ownership.

5 Conclusion

Previous studies on the linkage between recent immigration and domestic migration have focused on the unnecessary migration of native-born workers in response to immigrant inflow. Recently, however, the socioeconomic conditions surrounding immigration and domestic migration have changed drastically. Because of the industrial restructuring of labor-intensive and technology-intensive industries, the replacement of native-born workers by immigrants is unlikely. Employment opportunities have also decreased compared to those available during the past economic boom. New immigrants tend to move into gateway cities and regions due to the advantages they receive from ethnic networks established by settled immigrants. They also tend to work primarily in a limited number of industries due to limited communication skills. All of this indicates that new immigrants and settled immigrants are more likely to compete with each other in the local labor market.

The main objectives of this study were to examine whether the native-born workers and settled immigrants differed in their migratory responses to recent immigrants and to trace the disparate impact of recent immigrants across varying macroeconomic situations. We tested two research hypotheses, and our empirical results supported the first hypothesis, which predicted that the influence of recent immigration on domestic migration would vary between native-born workers and settled immigrants. Specifically, in 2006, when the number of immigrants increased, less educated settled immigrants tended to migrate outside their states, while native workers were less likely to move. Such out-migration of settled immigrants may have been triggered by job competition in local labor markets. Decreases in the out-migration probability of native-born workers might be attributed to the derived economic demand created by the increase of immigrants and the various social services supplied at lower prices by these new immigrants. For the second hypothesis, the share of recent immigrants, which previously had a significant impact in 2006 and 2009, was statistically insignificant in 2012. It appears that the "frozen in place" phenomenon had emerged during the aftermath of the economic recession.

The results of this study appear to challenge previous beliefs suggesting that new immigrants instigate competition with native-born workers in the labor market and cause unnecessary domestic migration. Regardless of macroeconomic situation, the out-migration probability of native-born workers was negatively associated with the share of recent immigration. The diverse local demand created by increased immigrant inflow, as well as the cost-effective services they provide, may serve as a pull factor to vitalize regional economies and sustain local population levels. In fact, the anti-immigration policy of the Trump Administration, which emphasizes the protection of native-born citizens, may prevent this positive effect from benefitting local economies.

This study expands upon previous research by investigating the influence of new immigrants not only on native-born workers but also on settled immigrants, analyzing these effects on internal migration using micro-data. By incorporating the American Community Survey (ACS)'s 1-year estimate data published annually since 2005, this study built a statistical model that showed immediate changes based

on specific the macroeconomic situations. Using this model, this study investigated the particular changes in the impact of immigration before the recession, during the recession, and after the recession.

Finally, this study provides clear implications for future research. It analyzed the influence of new immigrants on the migration of settled immigrants, based on the educational backgrounds of settled immigrants through interaction terms. If income levels or occupation types were taken into account, we might have been able to identify those affected by the inflow of immigrants in more precise detail. We also expect that the study might be enriched if further analysis can proceed with the legal status data, which might affect the employment possibility of immigrants, including citizenship and permanent residency that we could not sufficiently deal with in this paper due to the data limitation.

In addition, due to their status as a high level in the multilevel model, states may possess many diverse characteristics and therefore produce potentially biased estimation results. As in Saiz and Wachter (2011) stated, one of the reasons of native migration is a negative view of the increasing density of neighborhood immigrants within the metropolitan area. It informs that our research results may be derived differently with the types of spatial units or migration distance. Therefore, the implications and results of the study might be enriched through use of analytical and geographical units based on economic functions, such as homogeneous industrial and demographical composition, or labor market characteristics, such as metropolitan statistical areas.

Compliance with ethical standards

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