Irregular Migration Through the Lens of Migration Theories: Testing Classical Theories in Explaining Visa Overstay in South Korea

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Abstract

The Republic of Korea presents an interesting case for testing the predictive power of migration theories in explaining a specific group of undocumented migrants: visa overstayers. Studies of irregular migration often overlook the potential of migration theories to explain migrants' decisions to overstay their visas. Against this background, this study attempted to contribute to understanding the main drivers of irregular migration to the Republic of Korea from 143 countries between 2003 and 2013. Building on a synthesis of existing migration theories and their testing in the context of U.S. irregular migration, we replicated the analysis for the Korean case using five prevailing migration theories. The findings suggest that the neoclassical theory of migration, segmented labor market theory, and social capital theory are the most effective in explaining variations in irregular migration. Overall, our results are consistent with the predictions of international migration theories, except for social capital theory. Contrary to the generally accepted hypothesis, this study found that greater social capital among Korean migrants is more likely to facilitate legal migration, thereby reducing the need for undocumented stay. Owing to differences in how men and women decide to overstay their visas, we also conducted a gendered analysis. Strict measures against migrant violations, such as deportation, have a deterrent effect on female visa overstays, but do not affect their male counterparts. On the other hand, a strong driver of both female and male undocumented migration remains the labor demand for cheap, low-skilled foreign workers.

Keywords

Irregular migration; migration theories; South Korea; visa overstay

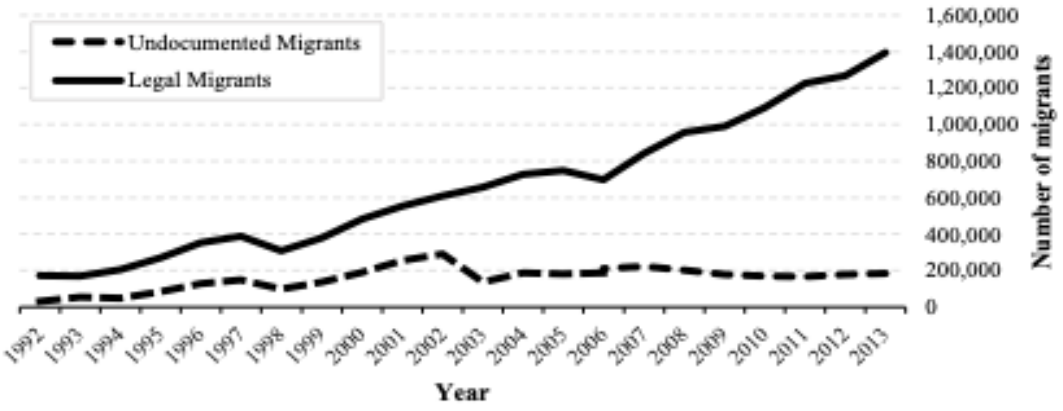
Introduction

Industrialization often goes hand in hand with a migration transition, in which native workers shift to office work or abroad. At the same time, low-skilled jobs increasingly accept foreign labor to fill positions that locals are unwilling to take. After the economic boom of the early 1990s, the Republic of Korea (hereafter, Korea) experienced a rapid increase in the flow of low-skilled migrant workers. Immigration grew 31-fold between 1990 and 2013, reaching 1.5 million in 2013. One factor driving this growth was the introduction of temporary migration programs in response to economic development. First, Korea introduced the Industrial Trainee System (ITS) in the early 1990s to meet the increasing labor demand in its rapidly expanding economy. Later, it was modified and replaced by an Employment Permit System (EPS). Both systems facilitated the migration of foreign workers and helped to meet the country's labor needs. However, they also increased the number of undocumented migrants (Khoo et al., 2008; Kim, 2011).

Since the introduction of the Industrial Trainee System in late 1991, the population of undocumented migrants has steadily increased, with only a minor decline during the 1997 Asian Financial crisis (see Figure 1). Most undocumented migrants were foreign workers who entered Korea under the Industrial Trainee Program. Although the program aimed to bring and train foreign workers employed in overseas Korean businesses, a growing shortage of unskilled industrial workers transformed the ITS into a "legitimate" loophole to supply local small and medium enterprises (SMEs) with foreign labor (Gray, 2006; Hahn & Choi, 2006; Kim, 2008).

Most migrant workers were employed in so-called 3D jobs (dirty, dangerous, and difficult jobs) and often faced exploitation by employers. The "trainees" faced harsh working conditions, delayed payments, discrimination, and restrictions on personal movement (Asian Legal Resource Centre, 2003; Gray, 2006; Hahn & Choi, 2006; Hee, 2000; Joint Committee for Migrant Workers Korea, 2001; Lee, 2001). Since the program was not designed for employment, Korea's labor code did not protect migrant workers' rights. The increasing number of exploitation cases led to the formation of the Migrant Workers' Support Movement (MWSM). This movement brought together various nongovernmental organizations, including religious groups, human rights institutions, trade unions, and migrant communities (Gray, 2006; Kim, 2011; Torneo, 2016).

Figure 1: Immigration Trends in Post-ITS Period



Note: Data compiled from the Korea Immigration Service (2025)

After years of protests and negotiations to modify the ITS, the Employment Permit System was introduced in 2003 and took effect the following year. Under the EPS, migrant workers gain rights and protections equal to those of native workers (Kim, 2011). EPS also facilitated the legalization of migrant workers who had remained without documentation as of March 2003, provided that their stay did not exceed three years (Kim, 2011; Torneo, 2016). The introduction of the EPS, coupled with the amnesty program, caused a sharp drop in the number of undocumented immigrants in 2003 and prompted structural changes in the composition of the migrant population (Figure 1). Before the early 2000s, the upward trend in irregular migration paralleled the growth in the population of legal immigrants. After the introduction of the EPS, the undocumented migrant population stopped growing and remained at approximately 180,000–200,000. The decision to phase out ITS in 2007 led to a further decline in the undocumented migrant population. However, legal migration continued to rise, as the EPS maintained a steady supply of migrant workers to Korean SMEs.

Although authorities have managed to control the number of undocumented migrants while ensuring a stable influx of legal immigrants, it is essential to understand why approximately 200 thousand migrants still reside in Korea as undocumented immigrants. Despite the availability of legal opportunities for residence and employment, irregular migration persists in Korea. Unlike the late 1990s and early 2000s, when irregular migration closely tracked the increase in legal immigration, subsequent years exhibited distinct patterns. This change indicates a shift in the causes of irregular migration in periods dominated by post-ITS and EPS policies. This study aims to explore these factors by identifying potential determinants of irregular migration and examining the relevance of current migration theories in the Korean context.

This paper can provide a deeper understanding of the rise in irregular migration following the implementation of temporary migration programs, such as the EPS. Previous experiences with EU and U.S. guest worker programs have demonstrated that temporary migrants' pursuit of permanent settlement is nearly inevitable (Castles, 2006; Martin, 2001; Ruhs, 2006). Countries that address labor shortages through temporary migration programs risk increased irregular migration. This was also evident in Korea, where the introduction of ITS led to a rise in irregular migration. However, the Global Commission on International Migration (2005) suggested that carefully designed temporary migration programs facilitate return migration or legal permanent settlement. Following their assumption, well-designed programs should not lead to an increase in the undocumented migrant population.

Interestingly, by addressing key shortcomings and redesigning ITS as EPS, Korea successfully curbed the rising trend in irregular migration. Although the commission's assumption was partially valid, irregular migration persisted even with a carefully designed EPS. Studying the Korean case offers insights into why migrants opt for unauthorized stays even in the presence of carefully designed formal migration programs. The findings may help countries seeking to address labor shortages through labor migration avoid irregular migration when launching temporary migration programs.

Theoretical background

The pioneering work of Massey et al. (1993) provided a detailed overview of existing theories, from the initiation to the perpetuation of international migration. Subsequent work focused on five migration theories: neoclassical economic theory, social capital theory, the new

economics of migration theory, segmented labor market theory, and world-systems theory (Massey & Espinosa, 1997). These theories explain legal migration and serve as a basis for understanding irregular migration. Despite the comprehensive framework, early studies by Massey and Espinosa (1997) focused primarily on the initiation of undocumented migration, with limited attention to visa overstays.

Although later, Massey et al. (2014) included both unauthorized border crossings and tourist visa overstays, they did not distinguish between the two. This study aims to address this issue by focusing solely on visa overstays. Since crossing the border and choosing to overstay visas involve different trade-offs, this study tests the predictive power of the migration theories outlined by Massey and Espinosa (1997) in explaining the variation in the number of visa overstayers. To our knowledge, previous research on visa overstayers has not tested the explanatory power of migration theories.

Several migration theories, including neoclassical theory, the new economics of migration, and dual labor market theory, explain migration drivers by reference to differences in labor market conditions. According to segmented labor market theory, labor demand in the destination country encourages foreign workers from labor-abundant countries to migrate in search of job opportunities in labor-scarce countries until wages in both countries converge to equilibrium (Bah, 2023; Cornelius & Salehyan, 2007; Leerkes et al., 2007; Massey & Espinosa, 1997; Piore, 1979). Unemployment at home is another factor that can discourage return after the visa expires. Fewer employment opportunities in their home country might push migrants to consider overstaying their visas. Therefore, we formulate the following hypotheses:

> *H1: Better employment opportunities and higher expected wages in Korea can encourage undocumented stays.*

The new economics of migration suggest that migration decisions are driven by the need to access markets other than the labor market. Underdeveloped financial markets and economic uncertainty in the country of origin push potential migrants to seek better opportunities abroad (Massey & Espinosa, 1997). According to this approach, migration decisions are also made to minimize the risks associated with market failure and the need for capital (Massey et al., 1993; Massey & Espinosa, 1997). Once in the destination country, migrants may stay longer to avoid uncertainties at home. The hypothesis is as follows:

> *H2: Economic uncertainty at home increases the likelihood of staying undocumented.*

On the other hand, international mobility would not be possible without globalization. In the global system, countries exchange people, goods, services, and capital. The Global Market Economy explains this process. Intense bilateral trade and the flow of FDI can promote the movement of human resources. Better mobility opportunities can create legal entry for potential visa overstayers. As some countries exchange more resources between them than with the rest of the world, the third hypothesis is as follows:

> *H3: Intense cooperation between migrant-receiving and migrant-sending countries increases the stock of undocumented migrants from migrant-sending countries.*

Social capital theory suggests that friends and relatives settled in a destination country are another reliable source of information (Leerkes et al., 2013; Massey & Espinosa, 1997). Settled migrants can assist undocumented newcomers in finding work and housing, thereby reducing costs and the risk of apprehension (Ambrosini, 2016; Massey & Espinosa, 1997).

Therefore, undocumented migrants often settle in areas with their ethnic communities, known as 'ethnic self-segregation' (Espenshade, 1994; Leerkes et al., 2007; Pena, 2009). Social capital theory also allows a reverse relationship between networking and irregular migration (Leerkes et al., 2013). Immigrants from large migrant communities may have better access to legal migration pathways. Vickstrom (2014) argued that migrants with greater social capital are less likely to become undocumented. Additionally, having a child born in the destination country (Massey et al., 2014), entering through real or sham marriages to citizens, or through family reunification programs, can create pathways to legal migration (Ambrosini, 2015; Caponi & Plesca, 2014). However, following the conventional view, we hypothesize the following:

H4: Greater social capital increases the likelihood of an undocumented stay.

Among all migration theories, the neoclassical theory remains dominant in explaining irregular migration. According to neoclassical economics, migration occurs when the benefits outweigh the costs (Bratsberg, 1995; Buehn & Eichler, 2013; Espenshade, 1994; Leerkes et al., 2013; Massey & Espinosa, 1997). Therefore, despite the benefits of migration, rational migrants also consider its costs. Unlike legal migration, undocumented trips involve implicit costs. Implicit costs often result from government policies aimed at reducing irregular migration, such as apprehending undocumented immigrants and imposing sanctions on employers (Leerkes, Engbersen, et al., 2012; Leerkes, Varsanyi, et al., 2012).

A higher likelihood of apprehension increases the opportunity costs of migration, as an unplanned termination of the journey may result in fewer benefits than expected. However, there is no empirical evidence showing that restrictive policies influence patterns of irregular migration (Cornelius & Salehyan, 2007; Espenshade, 1994; Leerkes, 2016; Leerkes et al., 2013; Leerkes, Engbersen, et al., 2012; Massey et al., 2002). To test the effectiveness of restrictive policies, the fifth hypothesis is as follows:

H5: Restrictive policies reduce irregular migration through increased migration costs.

Testing migration theories has always been challenging due to the limited availability of data. The challenge becomes even greater when examining irregular migration, for which data are seldom available across countries and years. Unlike existing studies on irregular migration that focus on a single destination and sending country, this study compares one destination country with 143 migrant-sending countries. Bratsberg (1995) conducted similar cross-country research on irregular migration in the United States. However, they used the gravity model without incorporating modern migration theories.

In contrast, this study tests five migration theories against the hypotheses outlined above. Our study is limited to the Korean context, as most undocumented migrants in Korea are visa overstays. Therefore, Korea presents a useful case study.

Literature review

Studies on migration in East Asia and Southeast Asia focus on labor market differences in both destination and source countries. These studies indicate that migration is strongly linked to a region's economic performance (Fong et al., 2019). During periods of strong regional development, local markets provide sufficient job opportunities, making cross-border job

searches prohibitively expensive. Conversely, slow regional growth creates a mobile workforce that is willing to overstay their visas if employment prospects in the destination country are favorable (Fong et al., 2019). Notably, geographic proximity plays a significant role in determining destination choice (Fong et al., 2019; Song & Cook, 2015). In Asia, migration often occurs in pursuit of jobs in neighboring countries. The case of irregular Cambodian migration to Thailand illustrates that irregular labor migration is driven by poverty and high unemployment in Cambodia, coupled with Thailand's demand for cheap labor (Chea, 2015). Similarly, migrant workers from Bangladesh are attracted by the potential for economic gain abroad due to limited opportunities at home, including poverty and unemployment (Ullah, 2010).

Interestingly, Asia is also one of the largest suppliers of female migrants (Ullah et al., 2019). Until recently, migration studies focused primarily on male migratory flows, with theories largely explaining male migration. Female migration received a focus in the 1980s. Early studies viewed female migrants solely as the wives of established migrants (Morokvasic, 1984). However, later studies acknowledge the phenomenon of working female migrants. Unlike male migrants, who often take jobs in the industrial sector, such as construction, manufacturing, and agriculture, female migrants fill the demand for unskilled jobs in the service sector (Oso & Ribas-Mateos, 2013; Ullah et al., 2023).

In the 'global chain of care', immigrant women replace local women in care-related occupations, such as domestic service or catering (Ehrenreich & Hochschild, 2002; Hochschild, 2000; Sassen, 1988). Furthermore, declining fertility rates and a shortage of 'brides' in Korea led to an increase in marriage migration (Oso & Ribas-Mateos, 2013; Truong, 1996). As different factors influence men's and women's decisions to overstay their visas, there is a growing interest in gendered analyses of migration (Donato et al., 2006; Piper, 2005).

Methods

Data

This study uses data from the Korea Immigration Service (KIS) (2025), which provides information on the total number of immigrants residing in Korea, their age, the number of undocumented migrants, and the average duration of their stay. In 2014, the KIS discontinued releasing disaggregated, country-specific statistics on irregular migration and began reporting aggregate data at the continental level. Therefore, the analysis is restricted to the most recent period for which data are available, covering annual statistics from 2003 to 2013. This period captures a growing immigrant population, which increased from 656,380 in 2003 to 1,576,034 in 2013. The final data include the number of immigrants from 143 source countries. Owing to missing information for some migrant-sending countries, we obtained unbalanced country-year panel data with 1,253 observations.

The dependent variable is the share of undocumented migrants in the total migrant population, rounded to the nearest 1,000 migrants. Stratified by gender, the dependent variable had the following three ratios:

$$TUI_{(A,t)} = \frac{Number\ of\ Male\ and\ Female\ Undocumented\ Immigrants_{(A,t)}}{Number\ of\ Total\ Male\ and\ Female\ Immigrants_{(A,t)}} \cdot 1{,}000 \qquad (1)$$

$$MUI_{(A,t)} = \frac{Number\ of\ Male\ Undocumented\ Immigrants_{(A,t)}}{Number\ of\ Total\ Male\ Immigrants_{(A,t)}} \cdot 1{,}000 \quad (2)$$

$$FUI_{(A,t)} = \frac{Number\ of\ Female\ Undocumented\ Immigrants_{(A,t)}}{Number\ of\ Total\ Female\ Immigrants_{(A,t)}} \cdot 1{,}000\ , \quad (3)$$

where TUI, MUI, and FUI represent the ratios of total undocumented immigrants, male undocumented immigrants, and female undocumented immigrants, respectively, to their respective totals from country A in year t.

Unlike previous studies (except for household surveys) that used amnesty applications (Bratsberg, 1995), apprehensions (Buehn & Eichler, 2013; Espenshade, 1994; Leerkes, Engbersen, et al., 2012; Leerkes, Varsanyi, et al., 2012), and estimates of undocumented migrants (Leerkes et al., 2013), this study uses the number of undocumented migrants who overstayed their visas to measure irregular migration. These administrative data provide accurate estimates of the undocumented migrant population and report statistics stratified by gender, enabling gender-specific analysis (see Table 4).

The only limitation of this proxy is a change in the age group of migrants. Earlier years reported an undocumented migrant population aged 15–60 only, whereas since 2006, it has considered the entire population regardless of age. This change in composition resulted in a slight artificial increase in irregular immigration between 2005 and 2006.

Explanatory variables

To examine the behavior of the dependent variable, the model includes 15 explanatory variables based on various migration theories (Massey & Espinosa, 1997). The explanatory variables are defined in Table 1. Data on these regressors were collected from different macro-level or administrative sources. When sex-specific statistics were unavailable in macro-level datasets, the available totals or averages were used in the sex-specific analysis.

Table 1: Definition of Explanatory Variables

Variable	Definition, Country (Gender)	Data Source (Period)
Undocumented migrants	Ratio of visa overstayers to foreign-born population, Bilateral (Total, Female, Male)	KIS (2008–2014)
Human Capital Model		
Average stay (months)	Weighted average of the residence duration for undocumented migrants, Bilateral (Total, Female, Male) [a]	KIS (2008–2014)
Average age between 15–60	Weighted average age across ten age groups between 15 and 60 years, Bilateral (Total, Female, Male) [a]	KIS (2008–2014)
Education (average)	Mean years of schooling, Home (Total, Female, Male).	UNDP (2025)
Segmented Labor Market Theory		
Labor demand	Ratio of the number of migrants with expired E9, E10, or D3 visas to the total E9, E10, or D3 visa holders, Bilateral (Total, Female, Male)	KIS (2008–2014)
Neoclassical Theory		

Variable	Definition, Country (Gender)	Data Source (Period)
Manufacturing wage (KRW)	Small and medium manufacturing business hourly salary in KRW 1,000, Korea (Total)	KOSIS (2011; 2017)
GDP per capita home (log)	Natural logarithm (log) of Gross Domestic Product (GDP) per capita in constant 2015 USD, Home (Total)	World Bank Group (2024b)
Unemployment at home	Unemployment rate (percentage of the labor force), Home (Total, Female, Male)	World Bank Group (2024d, 2024e, 2024f)
Law enforcement	Ratio of the number of immigrant violators by the total undocumented migrant population, Bilateral (Total)	KIS (2008–2014)
Social Capital Theory		
Dependent family of migrant (F1, F3)	Ratio of F1 and F3 visa holders to foreign-born population, Bilateral (Total, Female, Male)	KIS (2008–2014)
F2 & F6 marriage migrants	Ratio of F2 and F6 visa holders to the total foreign-born population, Bilateral (Total, Female, Male)	KIS (2008–2014)
New Economics of Migration		
Inflation (CPI) at home	Consumer Price Index (CPI), Home (Total)	World Bank Group (2024c)
Exchange rate (nominal)	Nominal exchange rates between the Korean KRW and the currency of each sending country, Bilateral (Total)	UNCTAD (2025)
Freedom at home	Sum of civil liberties and political rights indices, Home (Total)	Freedom House (2025)
Global Market Economy		
FDI growth at home	Rate of change in Foreign Direct Investment (FDI) between current and prior year over prior year, Home (Total)	World Bank Group (2024a)
Korean FDI	Natural logarithm of investment in KRW for Korean overseas affiliated companies & branches, Bilateral (Total)	Export-Import Bank of Korea (2025)

Note: [a] where the weight is the ratio of the number of migrants (by age/period of stay) to the total foreign-born population

Segmented Labor Market Theory. Piore's (1979) theory suggests that demand for low-skilled workers in the informal sector creates employment opportunities for undocumented migrants. The proportion of low-skilled migrant workers holding expired E9, E10, or D3 visas relative to the total number of E9, E10, or D3 visa holders was used as a proxy to measure labor demand for low-skilled undocumented migrant workers in the destination country.

Neoclassical Theory. Following neoclassical economics, binational wage differences are a vital part of cost–benefit analysis. To emphasize the importance of wage gaps in migrants' decision-making, the model uses monthly wage data for SMEs.

Korean manufacturing. The wage data are obtained from the Korean Statistical Information Service (KOSIS) (2011; 2017). Manufacturing wages act as a proxy for earnings in unskilled jobs, which labor migrants frequently fill. These monthly wages were converted into hourly wages. Owing to the lack of reliable wage data from some source countries, the model also includes GDP per capita as a proxy for average income in the country of origin. This measure

is then log-transformed to reduce skewness. Finally, the model considers unemployment levels in the country of origin as another factor influencing labor migration.

A high likelihood of being caught and deported increases migration costs and discourages individuals from irregular settlements (Espenshade, 1994; Massey & España, 1987; Todaro & Maruszko, 1987). To measure this risk, we created a proxy variable for law enforcement by dividing the number of immigrant violators by the total undocumented migrant population. Both data sources were obtained from KIS (2025). Immigrant violators include any migrant who is (1) subject to deportation; (2) receiving a warning, accusation, departure order, or recommendation to depart; or (3) paying any fine due to a violation of immigration law.

Social Capital Theory. Additionally, having 'social capital' reduces the risks and costs of migration by sharing information from established migrant communities with newcomers. Two indicators measure social networks. The first indicator is the share of immigrants' dependents used to represent family reunification, defined as the percentage of all F1 and F3 visa holders in the total foreign-born population. The second indicator is the proportion of F2 and F6 visa holders relative to the total foreign-born population, reflecting the number of married migrants eligible for permanent residence.

New Economics of Migration. The model also accounts for economic instability and uncertainty by incorporating each country's annual inflation rate and nominal exchange rates. Additionally, we considered the country's risk factors, such as political instability and human rights violations, as potential drivers of international migration. To measure human rights violations, we used the sum of the civil liberties and political rights indices from the Freedom House (2025). In this way, we obtained a measure ranging from 2 (lowest violations) to 14 (highest violations).

Global Market Economy. To account for globalization, we considered Korea's outward FDI. Korean FDI in other countries creates additional pathways for migration, as workers employed by Korean firms abroad may travel to Korea to work at headquarters and subsequently overstay their visas. However, overall growth in foreign investment may reduce the flow of undocumented immigrants (Massey & Espinosa, 1997). A large inflow of FDI into a migrant-sending country can improve labor market conditions in the source country and encourage return migration, thereby reducing the incentive to remain unauthorized. We reflect this relationship by examining the growth in inward FDI to the country of origin.

Human Capital Model. Finally, this study considered the demographic characteristics of migrants. First, we calculate the average age of migrants from each sending country. This variable was computed as a weighted average of the number of migrants across ten age groups, ranging from 15 to 60 years. Second, we computed the weighted mean duration of residence among undocumented migrants in Korea to measure migration experience. A longer stay may indicate a deeper understanding of the destination country's immigration laws, thereby increasing the likelihood of obtaining lawful residence. Third, we included the average years of schooling, based on data from the Human Development Report (UNDP) (2025). Although a more accurate measure would be the average educational attainment of migrants from each country to Korea, owing to data limitations, we assume that migrants from countries with higher average years of schooling are generally more likely to have higher educational levels. Since educational attainment is strongly correlated with GDP per capita, it was incorporated into a separate model.

Table 2 presents the summary statistics. Overall, the sample comprises migrants aged 36 years from countries with eight years of schooling, with female migrants being younger than their male counterparts. On average, migrants originate from upper-middle-income countries (with an average annual income of USD 13,100) and have an average unemployment rate of 7% in their home countries. However, some migrants come from lower-middle-income countries, as the minimum GDP per capita in our sample is USD 300. The manufacturing-sector wage of KRW 11,000 can approximate the average expected hourly pay in Korea, equivalent to approximately USD 8. Roughly 22% of all migrants were undocumented, which corresponds to 219 undocumented migrants per 1,000 migrants.

Table 2: Summary Statistics

	Total				**Female**				**Male**			
	Mean	**SD**	**Min.**	**Max.**	**Mean**	**SD**	**Min.**	**Max.**	**Mean**	**SD**	**Min.**	**Max.**
Undocumented migrants	219	204	4	1,000	163	183	0	1,000	245	228	0	1,000
Average stay (months)	53	28	1	120	49	33	0	120	52	30	0	120
Average age between 15–60	36	4	23	56	34	5	17	60	36	5	24	53
Education (average)	8	3	1	14	8	4	1	14	9	3	1	14
Labor demand	0.3	0.4	0	1	0.2	0.4	0	1	0.3	0.4	0	1
Manufacturing Wage (KRW)	11	1	8	13	11	1	8	13	11	1	8	13
GDP per capita home (USD100)	131	176	3	825	132	176	3	825	131	176	3	825
GDP per capita home (log)	9	1	6	11	9	1	6	11	9	1	6	11
Unemployment at home	7	5	0	28	8	6	0	31	7	4	0	26
Law enforcement	1	3	0	106	3	6	0	120	1	4	0	106
Dependents of migrant (F1, F3)	0.1	0.1	0	1	0.2	0.2	0	1	0.1	0.1	0	0
F2 & F6 marriage migrants	0.1	0.1	0	1	0.1	0.1	0	1	0.0	0.0	0	1
Inflation (CPI) at home	6	6	-10	59	6	6	-10	59	6	6	-10	59
Exchange rate (nominal)	487	730	0	5,306	491	748	0	5,306	490	731	0	5,306
Freedom at home	7	4	2	14	7	4	2	14	7	4	2	14
FDI growth at home	1	18	-188	559	1	18	-188	559	1	18	-188	559
Korean FDI (mln KRW)	154	590	0	7,320	164	608	0	7,320	155	591	0	7,320
Korean FDI (log)	12	8	0	23	12	7	0	23	12	8	0	23
N				*1,151*				*1,081*				*1,147*

Interestingly, the maximum law enforcement ratio indicates that there are more violations than the number of undocumented migrants, suggesting that legal migrants are often penalized as well. The proxy for labor demand among undocumented migrants indicates that, on average, 30% of employment visa holders are undocumented, a figure 10 percentage points lower for females. Unlike labor migrants, marriage migrants are mainly female, and most dependents are female migrants as well. This may suggest that labor migration is more prevalent among males, whereas family-related migration is more common among females.

Empirical analysis

Since the dependent variable is a count, this study employed a Poisson regression model to analyze variation in the undocumented migrant population. Testing the Poisson distribution assumption shows that the variance of the dependent variable significantly exceeds its mean, indicating overdispersion. Models that address overdispersion include the negative binomial model (Cameron & Trivedi, 2010) and the Poisson model with robust standard errors (Cameron & Trivedi, 2010; Wooldridge, 1999).

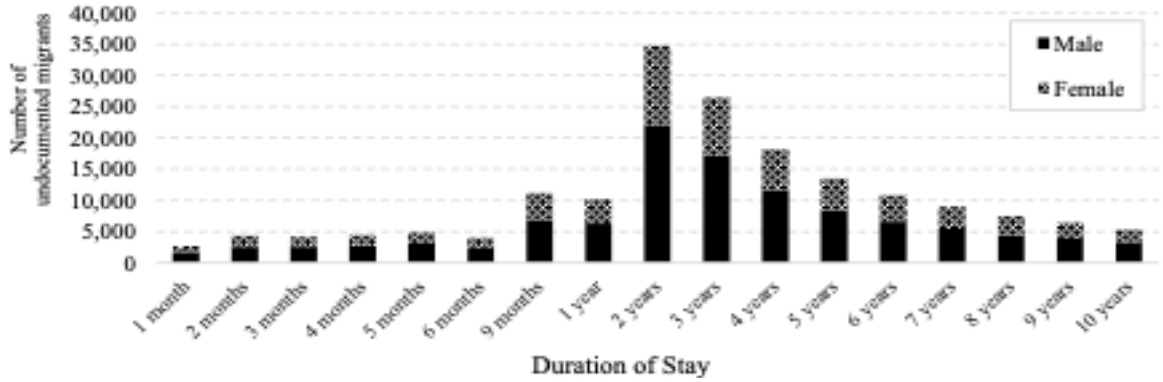
Owing to the longitudinal nature of the data, the conditional fixed-effects Poisson (CFEP) regression model is deemed appropriate (Allison & Waterman, 2002; Hausman et al., 1984). Unlike the random effects Poisson, which is subject to many restrictions (Wooldridge, 2010), the fixed effects Poisson remains consistent under a few assumptions. These assumptions can also be relaxed further. Transforming variance matrix estimators into a robust form makes fixed-effects Poisson (Poisson quasi-maximum likelihood) fully robust to distributional misspecification (Wooldridge, 2010).

The Poisson quasi-maximum likelihood method also outperforms the negative binomial method when analyzing over-dispersed panel data. Therefore, we selected Poisson as the primary estimation method. We also included a negative binomial model with country-level dummy variables to assess the robustness of our results. The fixed effects negative binomial model was not used because evidence indicates that the fixed effects negative binomial model "is not a true fixed effect method" and does not yield reliable estimates for panel data (Allison & Waterman, 2002). Notably, our model does not directly address potential endogeneity issues. There is a possible reverse causality between law enforcement and the undocumented migrant population, as increased irregular migration could lead to more restrictive policies. The failure to address this issue remains a key limitation of this study.

Results

Human Capital Model. Table 3 presents the empirical results for all undocumented migrants. The findings indicate that longer periods of residence are associated with lower levels of irregular immigration. Table 2 also shows that, on average, migrants remained without documentation for 52 months, approximately 4 years of unauthorized residence. Figure 2 confirms that, on average, undocumented migrants have short sojourns, meaning they generally do not remain in Korea for extended periods. The highest number of undocumented migrants occurs among both females and males who have lived for 2 years in Korea. Therefore, it can be concluded that most undocumented migrants in Korea overstay their visas for a short duration—usually approximately 2–4 years—and return home after they reach their migration goals. Only a few migrants overstay their visas for longer periods with the intention of obtaining permanent residence, which explains the negative relationship.

Figure 2: Undocumented Migrants by Average Duration of Stay for 2002–2013



Note: Data compiled from the Korea Immigration Service (2025)

Similar to the migration experience, an increase in educational attainment in the home country reduces the stock of undocumented migrants in Korea, with the effect statistically significant under both negative binomial and Poisson estimation. One can speculate that higher educational attainment at home corresponds to migrants with more years of schooling, who are less likely to overstay their visas and become undocumented migrants. Educated migrants can secure better jobs and earn higher wages both domestically and internationally. Therefore, they seriously perceive the negative consequences (e.g., deportation or a ban on entry) of undocumented stays.

Furthermore, age is associated with a greater proportion of undocumented migrants. This suggests that migrants may be more likely to overstay their visas as they grow older. Unlike the adult population, the younger migrant group, which primarily comprises students or dependents of permanent migrants, holds valid permits. Temporary migrants are not permitted to bring their children to Korea. The decision to remain longer is often made for employment purposes. Therefore, age is positively associated with irregular migration, implying a significant rise in irregularities during the migrant's productive years.

Table 3: Determinants of Irregular Migration (TUI)

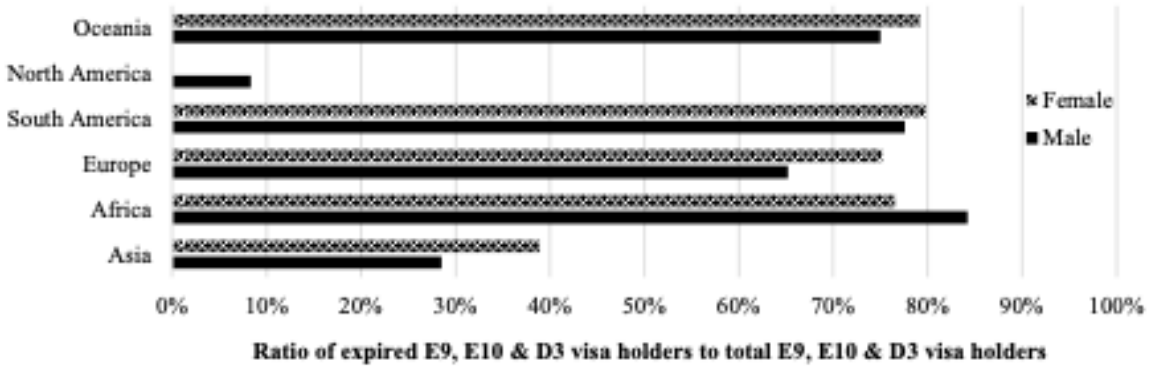
	Poisson FE				**Negative Binomial**			
	Model 1		**Model 2**		**Model 1**		**Model 2**	
	IRR	**SE**	**IRR**	**SE**	**IRR**	**SE**	**IRR**	**SE**
Human Capital Model								
Average stay (months)	0.994***	(0.00)	0.994***	(0.00)	0.991***	(0.00)	0.991***	(0.00)
Average age between 15–60	1.031***	(0.01)	1.029***	(0.01)	1.033***	(0.01)	1.032***	(0.01)
Education (average)			0.874**	(0.06)			0.894**	(0.04)
Segmented Labor Market Theory								
Labor demand	1.249***	(0.08)	1.244***	(0.08)	1.194***	(0.06)	1.192***	(0.06)
Neoclassical Theory of Migration								
Manufacturing wage (KRW)	0.909***	(0.02)	0.946***	(0.02)	0.900***	(0.01)	0.930***	(0.01)
GDP per capita home (log)	1.306	(0.28)			1.323*	(0.22)		
Unemployment at home	1.000	(0.01)	0.997	(0.01)	1.004	(0.01)	1.000	(0.01)
Law enforcement	0.997	(0.00)	0.997	(0.00)	0.962	(0.09)	0.963	(0.08)
Social Capital Theory								
Dependents of migrant (F1, F3)	0.316***	(0.11)	0.346***	(0.12)	0.399***	(0.11)	0.437***	(0.12)
F2 & F6 marriage migrants	0.614	(0.24)	0.657	(0.25)	0.885	(0.29)	0.979	(0.33)

	Poisson FE				Negative Binomial			
	Model 1		Model 2		Model 1		Model 2	
	IRR	SE	IRR	SE	IRR	SE	IRR	SE
New Economics of Migration								
Inflation (CPI) at home	1.003	(0.00)	1.003	(0.00)	1.004*	(0.00)	1.003	(0.00)
Exchange rate (nominal)	1.000	(0.00)	1.000	(0.00)	1.000	(0.00)	1.000	(0.00)
Freedom at home	0.971	(0.02)	0.970*	(0.02)	0.966**	(0.01)	0.965**	(0.01)
Global Market Economy								
FDI growth at home	1.000***	(0.00)	1.000***	(0.00)	1.000***	(0.00)	1.000***	(0.00)
Korean FDI (log)	0.995	(0.00)	0.995	(0.00)	1.000	(0.00)	1.001	(0.00)
Country dummy	NO		NO		YES		YES	
AIC	25,101		24,981		12,254		12,278	
χ^2	359		336		28,281		27,668	
N	1,151		1,154		1,151		1,154	

*Note: IRR – Incidence Rate Ratio; SE – Standard errors; AIC – Akaike Information Criterion, Significance levels: * p < .1, ** p < .05, *** p < .01*

Segmented Labor Market Theory. Labor demand is positively associated with visa overstay across all models. The shortage of industrial workers first triggered the labor migration in Korea. This shortage later led to the creation of shadow markets employing low-skilled migrant workers. Figure 3a shows that more than 70% of *unskilled* labor migrants (E9, E10, and D3 visa holders) from countries in Oceania, South America, Europe, and Africa are undocumented. It shows that available jobs for low-skilled workers encourage the flow of undocumented migrants.

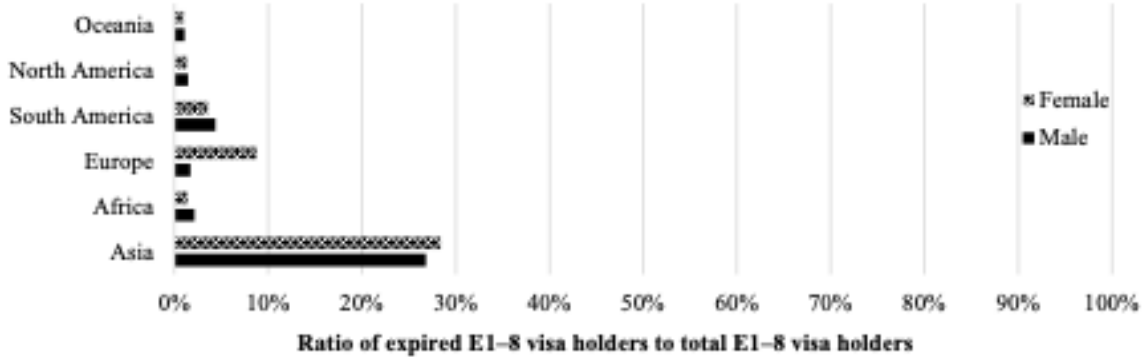
Figure 3a: Ratio of Undocumented Labor Migrants (Labor Demand) among Unskilled Workers by Continent, 2002–2013



Note: Data compiled from the Korea Immigration Service (2025)

In contrast, this figure corresponds to less than 10% (except in Asia) among *skilled* labor migrants (E1–E8 visa holders), as shown in Figure 3b. Employment opportunities for skilled workers are mainly available to native workers, or, in exceptional cases, to highly skilled professionals from abroad. In this case, the employer requires the legal status of their workers. Given the near absence of demand for undocumented workers in the skilled job sector, the share of undocumented workers among skilled labor is considerably low. This aligns with the view that labor demand in shadow economies sustains the flow of undocumented migrants (Bah, 2023; Leerkes et al., 2007).

Figure 3b: Ratio of Undocumented Labor Migrants among Skilled Workers by Continent, 2002–2013



Note: Data compiled from the Korea Immigration Service (2025)

Neoclassical theory posits that wage disparities between countries are a primary cause of irregular migration. However, this study found no positive relationship between wages and irregular migration. Instead, our results show a negative coefficient. Since the data reflect official wages, this may indicate that undocumented migrants earn less than official pay rates. This implies that higher wages encourage legal migration and discourage lower-paid undocumented workers from staying in the country.

The GDP per capita at home has a small positive effect on the composition of the undocumented migrant population. An increase in GDP per capita can create previously unattainable opportunities for migration, increasing the flow of both documented and undocumented migrants. Regarding employment opportunities at home, we found no significant association. Similarly, Buehn and Eichler (2013) concluded that unemployment has heterogeneous effects across different regions.

Although previous studies emphasize the impact of deportation on the undocumented migrant population through psychological pressure (Buehn & Eichler, 2013; Vinogradova, 2016) and increased migration costs (Cornelius & Salehyan, 2007; Massey et al., 2014), the variable related to law enforcement shows insignificant results, suggesting that a higher punishment rate does not reduce irregular migration, as hypothesized.

Social Capital Theory. In contrast to previous studies (Engbersen et al., 2006; Leerkes et al., 2007; Leerkes, Varsanyi, et al., 2012; Massey et al., 2014), this study found a negative association between social networks and irregular migration. A greater proportion of F1 and F3 visa holders decreases the likelihood of undocumented migration. Migrants entering as dependents of already settled Korean migrants are more likely to obtain lawful residence. Korean immigration policy offers a legal pathway for long-term or permanent visa holders to bring their family members. Therefore, it diminishes incentives for unauthorized stays among migrant groups with high social capital.

Finally, variables under the global market economy and the new economics of migration display a weak relationship. Under the *new economics of migration*, only the freedom index has a small negative effect on decisions to migrate irregularly. According to the negative binomial model, countries with restricted freedom tend to produce fewer undocumented migrants. Migrants from countries with restricted freedom try to settle in Korea legally to minimize the risks associated with forced return home. Under the theory of the *global market economy*, our findings suggest no relationship between FDI and irregular migration. Although statistically

significant, a zero coefficient suggests no relationship. Similarly, Korean FDI to the source country, a proxy for legal migration pathways, is insignificant.

The empirical findings of *the by-gender analysis* in Table 4 are consistent with the main estimation results (Table 3). Age plays a less important role for males than for females. Higher deportation of undocumented migrants has a strong deterring effect on the female migrant population. Unlike their male counterparts, female migrants' risk aversion makes them more sensitive to the risk of deportation (Filippin, 2016; Nelson, 2015). The risk of deportation can put psychological pressure on women and increase the implicit costs of an undocumented stay.

Women can also have dependent children (Caponi & Plesca, 2014) and risk being separated if they are deported. Given these factors, women may avoid illegal pathways when the risk of deportation is high. Therefore, with stricter measures in place, the undocumented female migrant population tends to decrease. Compared with females, males, on average, visit Korea to seek employment. Despite the risk of deportation and the higher costs of migration, the incentive to earn more than in home counties encourages male migrants to take risks.

Social capital theory is more pronounced among female migrants, as the coefficient for all F1 and F3 visa holders is highly significant for females. Education is not a significant factor among female migrants in their decision to remain undocumented. One can assume that intuition and risk aversion are more important than education in decision-making among females. The effects of inflation, GDP per capita, and freedom at home are insignificant in the by-gender analysis. This might be because economic and political uncertainty can have an aggregate effect that is independent of migrants' gender.

Table 4: Determinants of Irregular Migration by Gender Using Poisson

	FUI				MUI			
	Model 1		Model 2		Model 1		Model 2	
	IRR	SE	IRR	SE	IRR	SE	IRR	SE
Human Capital Model								
Average stay (months)	0.995***	(0.00)	0.995***	(0.00)	0.995***	(0.00)	0.994***	(0.00)
Average age between 15 & 60	1.034***	(0.01)	1.034***	(0.01)	1.025***	(0.01)	1.024**	(0.01)
Education (average)			0.991	(0.09)			0.826**	(0.07)
Segmented Labor Market Theory								
Labor demand	1.315***	(0.09)	1.304***	(0.09)	1.279***	(0.09)	1.262***	(0.09)
Neoclassical Theory of Migration								
Manufacturing wage (KRW) T	0.930***	(0.02)	0.921***	(0.02)	0.918***	(0.02)	0.959*	(0.02)
GDP per capita home (log) T	0.814	(0.25)			1.263	(0.30)		
Unemployment at home	1.014	(0.02)	1.018	(0.02)	1.002	(0.01)	1.001	(0.01)
Law enforcement T	0.969***	(0.01)	0.968***	(0.01)	0.996	(0.00)	0.996	(0.00)
Social Capital Theory								
Dependents of migrant (F1, F3)	0.358***	(0.10)	0.352***	(0.09)	0.320**	(0.17)	0.368*	(0.19)
F2 & F6 marriage migrants	0.724	(0.25)	0.701	(0.23)	1.037	(0.52)	1.100	(0.52)
New Economics of Migration								
Inflation (CPI) at home T	0.998	(0.00)	0.998	(0.00)	1.004	(0.00)	1.004	(0.00)
Exchange rate (nominal) T	1.000	(0.00)	1.000	(0.00)	1.000	(0.00)	1.000	(0.00)
Freedom at home T	0.994	(0.02)	0.997	(0.02)	0.989	(0.02)	0.989	(0.02)
Global Market Economy								
FDI growth at home T	1.002*	(0.00)	1.002*	(0.00)	1.000***	(0.00)	1.000***	(0.00)

	FUI				MUI			
	Model 1		Model 2		Model 1		Model 2	
	IRR	SE	IRR	SE	IRR	SE	IRR	SE
Korean FDI (log) ^{T}	0.991*	(0.01)	0.991*	(0.00)	0.995	(0.00)	0.996	(0.00)
AIC	35,324		35,022		33,535		32,727	
χ^2	298		302		251		299	
N	1,081		1,084		1,147		1,148	

*Note: The total value is taken for a variable with the subscript "T". IRR – incidence rate ratio; SE – standard error; AIC – Akaike information criterion; significance levels: * $p < .1$, ** $p < .05$, *** $p < .01$*

Another noticeable change is the effect of outward FDI from Korea. Korean FDI in the source country has a small negative effect on the undocumented stay of females. As part of the ITS, Korean multinational companies operating abroad created opportunities for local workers to travel to Korea as trainees. These multinational affiliates often send local workers to their headquarters to increase their qualifications and gain work experience in Korea. Therefore, it facilitates visa applications and provides readily available jobs. The prevalence of this effect among females can be attributed to the composition of the FDI. Most Korean firms operating in developing countries are in the textile industry (Buckley et al., 2022), which has a larger share of female workers. Other factors similarly influenced males and females, as described previously in the primary analysis.

Outlier Analysis. For a robustness check, we conducted an outlier analysis. A country was omitted if the predicted residuals deviated by more than two standard deviations for more than four years (Schmeidl, 1997). Overall, five countries were omitted: Bangladesh, Ghana, Iran, Mali, and Peru. The results of the outlier analysis are presented in Table 5.

Table 5: Outlier Analysis

	Poisson (TUI)				Poisson (FUI)				Poisson (MUI)				Negative Binomial (TUI)			
	Model 1		Model 2		Model 1		Model 2		Model 1		Model 2		Model 1		Model 2	
	IRR	SE	IRR	SE	IRR	SE	IRR	SE	IRR	SE	IRR	SE	IRR	SE	IRR	SE
Human Capital Model																
Average stay (months)	0.993**	(0.00)	0.993***	(0.00)	0.995***	(0.00)	0.995***	(0.00)	0.994***	(0.00)	0.994***	(0.00)	0.991***	(0.00)	0.991***	(0.00)
Average age between 15–60	1.025**	(0.01)	1.023***	(0.01)	1.030***	(0.01)	1.031***	(0.01)	1.021**	(0.01)	1.021**	(0.01)	1.030***	(0.01)	1.029***	(0.01)
Education (average)			0.885*	(0.06)			1.001	(0.10)			0.829**	(0.07)			0.902**	(0.04)
Segmented Labor Market Theory																
Labor demand	1.181**	(0.08)	1.179**	(0.08)	1.274***	(0.09)	1.261***	(0.09)	1.213***	(0.09)	1.200**	(0.09)	1.166***	(0.06)	1.164***	(0.06)
Neoclassical Theory of Migration																
Manufacturing wage (KRW)	0.903**	(0.02)	0.937***	(0.02)	0.931***	(0.02)	0.917***	(0.02)	0.912***	(0.02)	0.954**	(0.02)	0.898***	(0.01)	0.926***	(0.01)
GDP per capita home (log)	1.296	(0.29)			0.772	(0.25)			1.268	(0.32)			1.301	(0.22)		
Unemployment at home	0.996	(0.01)	0.994	(0.01)	1.013	(0.02)	1.018	(0.02)	1.001	(0.01)	1.001	(0.01)	1.004	(0.01)	1.000	(0.01)
Law enforcement	0.996	(0.00)	0.996	(0.00)	0.964***	(0.01)	0.963***	(0.01)	0.995	(0.00)	0.996	(0.00)	0.962	(0.09)	0.963	(0.08)
Social Capital Theory																
Dependents of migrant (F1, F3)	0.331**	(0.11)	0.361***	(0.12)	0.360***	(0.10)	0.354***	(0.10)	0.341*	(0.19)	0.376*	(0.20)	0.408***	(0.11)	0.443***	(0.12)
F2 & F6 marriage migrants	0.593	(0.23)	0.624	(0.25)	0.673	(0.24)	0.652	(0.22)	0.977	(0.50)	1.033	(0.49)	0.869	(0.28)	0.952	(0.33)
New Economics of Migration																
Inflation (CPI) at home	1.003	(0.00)	1.003	(0.00)	0.998	(0.00)	0.998	(0.00)	1.004	(0.00)	1.004	(0.00)	1.003	(0.00)	1.003	(0.00)
Exchange rate (nominal)	1.000	(0.00)	1.000	(0.00)	1.000	(0.00)	1.000	(0.00)	1.000	(0.00)	1.000	(0.00)	1.000	(0.00)	1.000	(0.00)
Freedom at home	0.963*	(0.02)	0.963*	(0.02)	0.991	(0.03)	0.994	(0.02)	0.986	(0.03)	0.988	(0.03)	0.961**	(0.02)	0.960**	(0.02)
Global Market Economy																
FDI growth at home	1.000**	(0.00)	1.000***	(0.00)	1.002*	(0.00)	1.002*	(0.00)	1.000***	(0.00)	1.000***	(0.00)	1.000***	(0.00)	1.000***	(0.00)
Korean FDI (log)	0.995	(0.00)	0.995	(0.00)	0.994	(0.01)	0.993	(0.01)	0.995	(0.00)	0.995	(0.00)	1.001	(0.00)	1.001	(0.00)
Country dummy	NO		NO		NO		NO		NO		NO		YES		YES	
AIC	23,915		23,825		33,884		33,594		32,502		31,746		11,619		11,644	
χ^2	564		493		270		274		231		272		26,098		25,479	
N	1,102		1,105		1,032		1,035		1,098		1,099		1,102		1,105	

*Note: IRR – incidence rate ratio; SE – standard error; AIC – Akaike information criterion; significance levels: * p < .1, ** p < .05, *** p < .01*

Slight changes were observed after the omission of outliers. Korea's outward FDI lost its significance. As noted, Korean outward FDI targets industries in low-income countries. All six outlier countries are developing countries, with Bangladesh having the largest textile industry. The effect of Korean FDI on Bangladesh's textile industry may have amplified the previous impact of FDI on irregular migration.

Another notable development is the lower coefficient for the demand for undocumented migrant workers across all models, for both genders. The reduced magnitude of the effect suggests that demand for migrant workers in the underground economy may be targeted at immigrants from these six countries. A similar effect is observed with improved well-being. Growth in GDP per capita has a negligible effect on the remaining countries.

Discussion

By testing five migration theories to explain visa overstay, we found some supporting evidence for the Segmented Labor Market Theory, the Neoclassical Theory, and the Social Capital Theory. Additionally, migrants' human capital plays a crucial role in deterring visa overstays. Previously, Massey et al. (1993, 2002, 2014) reported a negative association between cumulative U.S. experience and irregular migration from Central America. Vinogradova (2016) suggested that the constant fear of being apprehended shortens the duration of stay for undocumented migrants and introduced a framework of temporary irregular immigration.

Similarly, our findings align with those of previous studies, which show that longer stays are associated with lower rates of visa overstay. Migrants who overstay their visas typically do not settle permanently in the country; instead, they remain for 2–4 years. One could argue that the visa duration is too short for migrants to achieve their migration objectives. As neoclassical theory suggests, migrants overstay when the benefits of remaining exceed the costs of leaving. Therefore, when visas expire, but potential benefits remain, migrants may be motivated to overstay their visas. This may be why restrictive law enforcement and deportation are ineffective. Despite authorities' efforts to deter migration through strict policies, the benefits of an unauthorized stay can still outweigh these costs.

On the other hand, the benefits of unauthorized stays stem from labor-market demand for undocumented migrants. Suppose migrants have employment opportunities in shadow markets that allow them to continue earning benefits after their visas expire. In that case, they can choose to overstay their visa to compensate for benefits they could not have earned during their legal stay. Therefore, labor demand in shadow markets that are ready to employ undocumented migrants can encourage visa overstays. This finding provides additional support for the segmented labor market theory, which posits that labor demand in host countries drives irregular migration.

Our proxies for social capital theory indicate that social capital is associated with lower visa overstay, contrary to the expected inverse relationship. Originally, social capital theory suggested that migrant communities create migration routes for their undocumented counterparts. Based on our findings, we can speculate that greater social capital may indeed create better opportunities for migration, but primarily for legal rather than irregular migration. The problem of visa overstays can be primarily attributed to limited opportunities to remain lawfully in the country. Social capital can help create these opportunities. The ability of already settled Korean migrants to facilitate their relatives' entry and residence in Korea

reduces the need for unauthorized stays. Notably, our study did not account for the possibility of reverse causality, where existing legal migration pathways expand social capital, and only then does social capital create pathways for legal migration. Given the associative nature of the study, we can only explain the relationship, not make causal claims.

Conclusion

This study examines the determinants of irregular migration via five migration theories. The analysis focused on irregular immigration from 143 countries to Korea between 2003 and 2013. We examined undocumented migrants to understand the motivations for their continued stay after their visas expired. Although this study considers only two or three determinants for each of the five theories of migration outlined by Massey and Espinosa (1997), it provides insight into the explanatory power of these theories in Korea. Using count-data estimation methods, we found that neoclassical theory, segmented labor theory, and social capital theory explain variation in irregular migration.

Consistent with segmented labor theory, this study provides evidence that labor market conditions are a key determinant of labor market conditions. The existence of shadow labor markets substantially increases the population of undocumented migrants. Therefore, irregular immigration can be reduced by reducing incentives for domestic firms to employ undocumented migrants. One option is to streamline legal procedures and reduce the additional fees associated with hiring legal migrants. Generally, firms might opt to employ undocumented migrants owing to the limited supply of local workers willing to fill that position and the burdensome hiring process for legal migrants.

Easing the hiring process for legal migrants and expanding legal options for migrant employment can meet the higher demand for low-skilled workers and reduce the need to employ undocumented migrants. Another option is increasing the cost of hiring undocumented migrants by introducing employee sanctions. By sanctioning secondary markets, it is possible to reduce the incentives for domestic firms to employ undocumented migrants. Lower demand and, consequently, fewer job openings can reduce the incentive for migrants seeking employment to remain in the country without documentation.

Contrary to the widely accepted view in social capital theory, this study found that social capital in Korea facilitates a legal pathway for migration. Family unification programs facilitate the process through which family members of existing migrants obtain Korean visas. Larger migrant communities also possess greater knowledge of legislation, housing, and labor markets and thus can assist new migrants with legal residence and a smoother assimilation into the new community. A similar effect was observed for longer sojourns. A negative relationship between visa overstay and migration duration can indicate the achievement of migration goals, leading to return migration and thus reducing the size of the undocumented migrant population. It can also suggest that a longer sojourn may help one find lawful means of obtaining residence.

A longer stay in the country helps accumulate knowledge, identify legal means to extend visas, and thus reduce the risk of undocumented stay. Therefore, extending the period of legal residence (2–4 years) can facilitate migrants' ability to achieve their goals lawfully. A longer visa period can facilitate voluntary return migration, thereby reducing the need for undocumented stays.

Disclosure statement

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