Stay Longer, Fill the Vacancy: Evidence from South Korea's New Visa System

Jongkwan Lee Yujeong Lee Hee-Seung Yang

Yonsei University

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Contents

Introduction

Motivation

- Several advanced economies have experienced large **shortage** of low-skilled workers.
  - In sectors such as **agriculture**, **construction**, and **low-skilled manufacturing**
  - Due to the increase in **education** and the **aging** of the native population
- The **shortage** in these sectors was **exacerbated** after the Covid-19 pandemic.
- **Immigrants** fill those **bottlenecks** in many countries.
  - They are specialized in **manual** and **physically-intensive** jobs (Peri and Sparber 2009)

Motivation

- **South Korea** is an extreme example of a highly **educated** and **aging** society.
  - Also experiencing a significant labor **shortage**
- To relieve the labor **shortage**, South Korea runs a **foreign guest** worker program.
  - Employment Permit System (EPS)
- However, EPS workers are **temporary** workers.
  - They can work up to 4 years and 10 months.
- Two Problems:
  1. The loss of **firm-specific** human capital $\rightarrow$ productivity loss
  2. **Significant admin cost** to firms for **re-hiring** process
- In 2017, Korean government introduced a **new visa** for **stable** stay of the **guest** workers.

This Paper

- Examines the impact of the **new visa** system (E-7-4) on outcomes of **local firms**.
  - Job vacancy, Value added (manufacturing), Employment, and wage
- By exploiting the **pre-period exposure** to the new visa system across **227** cities

This Paper

- Examines the impact of the **new visa** system (E-7-4) on outcomes of **local firms**.
  - Job vacancy, Value added (manufacturing), Employment, and wage
- By exploiting the **pre-period exposure** to the new visa system across **227** cities
- **Contributions**:
  1. A policy that extends the **length of stay** for immigrants (**not** the **inflow** of them)
  2. **Heterogeneous** job vacancy and productivity effect across regions.
  3. **Unique** setting (South Korea): highly educated + fastest aging $\rightarrow$ labor shortage

Preview of Findings

1. The introduction of the E-7-4 system **lowered job vacancies** in certain industries. (e.g., manufacturing, agriculture).
2. The new visa enhanced labor **productivity**, measured by the **value added** per worker.
3. **Heterogeneity**: the job vacancy (productivity) effect pronounced in non-Seoul (Seoul).
4. The policy did **not** lead to an increase in local **employment** and **wage**.

Related Literature

Low-skilled Immigration and Local Labor Market

- US: (Peri, 2011; Monras, 2020; Lee, Peri, and Yasenov, 2022)
- Europe: (Edo, 2019; Dustmann, Schönberg, and Stuhler, 2017)
- Korea: (Kim, 2021; Kim and Lee, 2023; Kim, Lee, and Peri, 2024)

The Status of Immigrants

- Pan (2012), Chassamboulli and Peri (2015), Albert (2021), Arendt et al. (2025), Elias et al. (2025)

Immigration and Labor Shortage

- Anastasopoulos, Borjas, Cook, and Lachanski (2021): Mariel boatlift $\rightarrow$ job vacancies $\downarrow$
- Foged, Kreuder, and Peri (2022): Examines a policy that matched refugees to occupations with local labor shortages

Institutional Background

EPS (Employment Permit System)

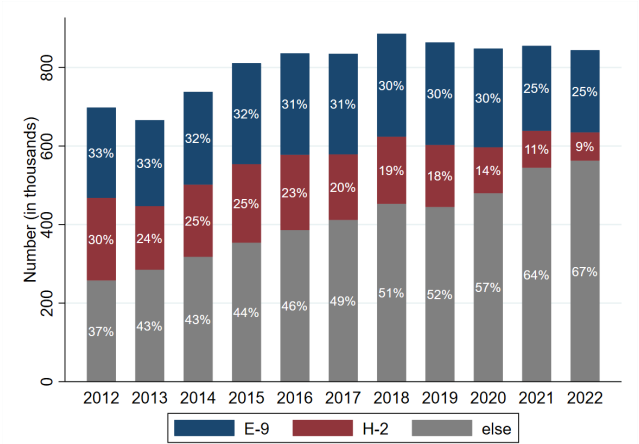
- EPS was introduced in 2004 to address the labor shortages in certain sectors.
  - Government-to-government arrangement with 16 Asian countries

1. E-9 visa: mainly in manufacturing, agriculture, and fishery
2. H-2 visa: above sectors + some service sectors

- Restrictions on Immigrants' Stay
  - Must return to their home countries after (max.) 4 years and 10 months.
  - Family invitation is not allowed (E-9) or allowed with restrictions (H-2).

- This temporary stay is unwelcomed by both foreign workers and employers.
  - Hinders the assimilation of immigrants.
  - Leads to the loss of firm-specific human capital and re-hiring cost

Share of E-9, H-2 foreign workers



Source: Survey on Immigrant's Living Conditions and Labour Force, Statistics Korea

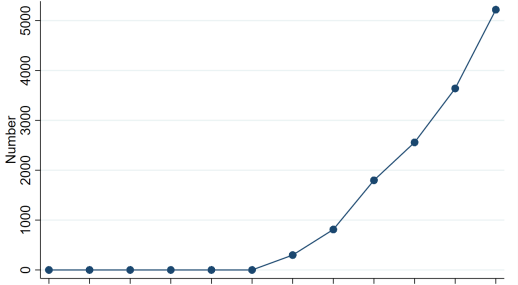
Skilled Worker Points System Visa (E-7-4 visa)

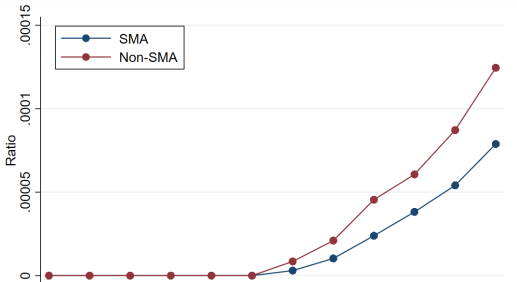
- For foreign workers (with **E-9, E-10, and H-2 visa**) who worked more than 4 years
- Eligibilities are evaluated by
  - Industrial contribution (annual earnings)
  - Future value (e.g. skillfulness, Korean fluency, age) based on the points system
  - Additional points for long-term work or rural areas
- Firms in manufacturing, construction, agriculture and fisheries can hire E-7-4 workers
  - Depending on the firm size

Timeline of E-7-4

- 2017/2 — Pilot period
- 2018 — Introduction of E-7-4 Visa
- 2019 — Quota for the recommendation of related ministries
- 2023/2 — Reformed as K-point E74 (large-scale expansion)

Trends of E-7-4





Source: Registered Foreigners by Districts Data, Korea Immigration Service

Advantages of E-7-4

- E-7-4 visa guarantees the **stable stay of foreign guest workers**.
  - Continuous stay in Korea without the process of returning to home countries.
  - Family invitation with F-3 visa
    - the same stay period as E-7-4 worker and economic activities (though restrictive).
- Channels to **relieve the labor shortage / enhance productivity**
  1. No loss of firm-specific human capital
  2. Stability to firms in sectors experiencing labor shortages.
  3. May induce a positive behavioral change in eligible workers (E-9, E-10, and H-2)

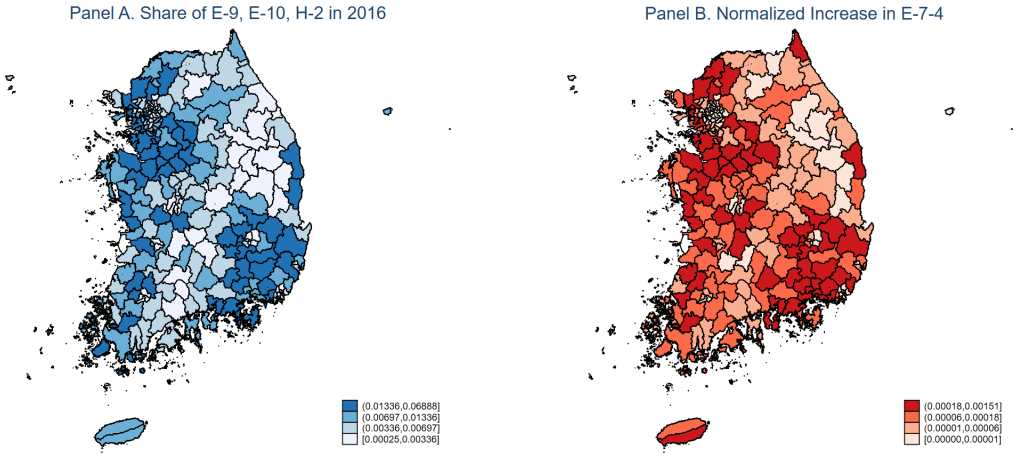
Data

Data

The district–year level panel dataset (227 districts for 2012–2022).

1. Whole immigrant population
   - Provided by Korea Immigration Service
   - We can identify immigrants' visas and registered districts.
   - # of E-9, E-10, H-2, and E-7-4 foreigners and standardize it by 2016 district population.

Distribution E-9+E-10+H-2 and E-7-4



Source: Registered Foreigners by Districts Data, Korea Immigration Service

Data (ctd.)

2. Job vacancy
   - Provided by Korean Employment Information Services
   - We can identify job vacancies at the end of each month by districts and industries.

3. Value added
   - Provided from Mine and Manufacturing Survey
   - Value added per employee is defined as

$$\frac{\text{Output Value} - \text{Intermediate Input Costs}}{\text{Number of Employees}}$$

4. Employment and wage
   - Provided by Local Area Labor Force Survey (October version for each year)
   - Collapse the individual-level into 162 city-level

Industry Classification

- Immigration policy specifies the list of industries where E-9, E-10, and H-2 workers are (or are not) allowed to work.
- We classify industries by the exposure to E-7-4 system.

Classification	Industries
Direct Exposure	Manufacturing, Agriculture, Forestry, Fisheries, Construction
Partial Exposure	Industries not specified in other groups (e.g. Mining, Wholesale and Retail Trade)
No Exposure	Financial and Insurance Activities, Real Estate Activities, Education, Electricity, Gas, Steam and Air Conditioning Supply

Summary Statstics

	Mean	SD	Min	Max	N
Panel A: Key Outcomes					
Job Vacancy (Normalized)	0.00445	0.00383	0.00020	0.04419	2,497
Value Added Per Employee (in 1 million KRW)					
Manufacturing	138.5448	102.9386	-186.5468	1419.957	2,491
Root Industries	142.9168	89.22931	-211.5015	730.0222	2,280
Employment (Normalized)					
Manufacturing	0.07323	0.04780	0.00674	0.33242	2,492
Low-Skilled Local Service	0.17966	0.03180	0.05954	0.35131	2,492
High-Skilled Local Service	0.14282	0.05061	0.03695	0.43622	2,492
Median Monthly Wage (in 10,000 won)					
Manufacturing	229.88724	57.52195	0	480	2,492
Low-Skilled Service	154.67496	36.10119	0	250	2,492
High-Skilled Service	237.01244	38.49204	120	350	2,492
Panel B: Treatment Intensity					
2016 E-9+E-10+H-2 share	0.01090	0.01227	0.00025	0.06888	2,497
Panel C: District Characteristics					
2016 Population	227,343	219093.2	10,001	1,194,041	2,497
2016 Working Age Population	166198.4	166357.5	7,112	913,312	2,497
2016 Rural Population Share	0.44867	0.44143	0	1	2,497
2016 Senior Population Share	0.18600	0.07825	0.06649	0.37490	2,497
2015 University Graduates Share	0.16764	0.07502	0.07073	0.49492	2,497
2016 Manufacturers Share	0.13649	0.09795	0.02001	0.52414	2,497
2016 Other Foreigners Share	0.01076	0.00857	0.00271	0.05974	2,497

Empirical Framework

Empirical Framework

$$y_{i,t}^{j} = \Sigma_t \beta_t^j (EEH_{i,2016} \times D_t) + \Sigma_t \gamma_t^j (X_{i,2016} \times D_t) + \theta_i + \lambda_t + \epsilon_{i,t} \quad (1)$$

- $y_{i,t}^{j}$: Outcome y for industry group j in district i at year t
- $EEH_{i,2016}$: Share of (E-9+E-10+H-2) out of 2016 population in district i
- D_t : Year dummy variable (2012-2022)
- $X_{i,2016}$: District characteristics fixed at the pre-period
  - Living zones, the share of rural/senior population, the share of university graduates (2015), the log of population, the share of manufacturing businesses, value added per employee in manufacturing, and the share of foreigners other than E-9, E-10, H-2, E-7-4, and F-3
- θ_i : District fixed effect / λ_t : Year fixed effect

$\rightarrow$ Standard errors are clustered at the district level.

$\rightarrow$ Weighted by 2016 district's population.

Key Outcomes

1. Job vacancy (Labor shortage)

$$\frac{jobvac^{j}_{i,t}}{pop_{i,2016}}, \quad j = \{overall, direct, partial, no\}$$

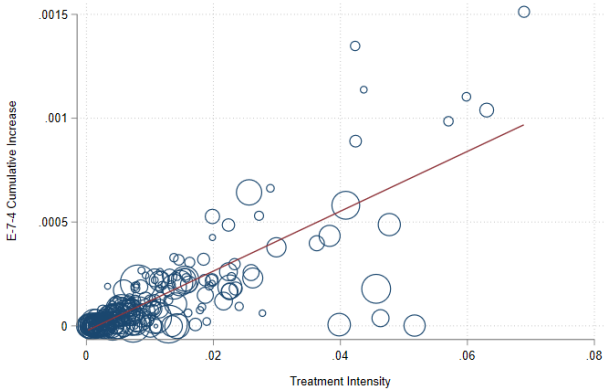
2. Value Added Per Employee (Labor productivity)

$$log(\frac{valueadd^{j}_{i,t}}{emp^{j}_{i,t}}), \quad j = \{manufacturing\}$$

3. Employment and Wage

$$\frac{emp^{j}_{i,t}}{pop_{i,2016}} \text{ and } log(median\ wage_{i,t}), \quad j = \{manu, low, high\}$$

Treatment Intensity and E-7-4 Increase



Source: Registered Foreigners by Districts Data, Korea Immigration Service

Treatment Intensity and E-7-4 Increase (Yearly)

	(1) Δ2016-2017	(2) Δ2016-2018	(3) Δ2016-2019	(4) Δ2016-2020	(5) Δ2016-2021	(6) Δ2016-2022
Treatment Intensity	0.000369**	0.000968**	0.00232**	0.00358***	0.00500***	0.00676***
	(0.000133)	(0.000328)	(0.000749)	(0.00107)	(0.00141)	(0.00190)
Observations	227	227	227	227	227	227
R^2	0.63	0.73	0.73	0.76	0.79	0.82

Validity

Results

Impacts on Job Vacancy

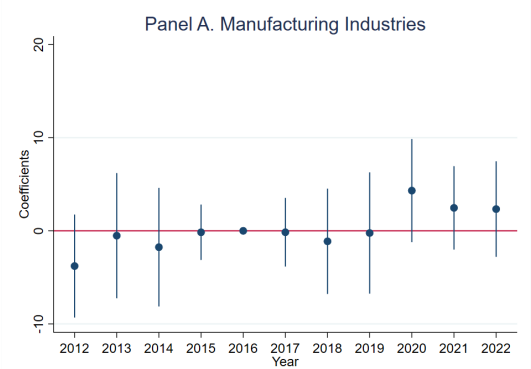
Impacts on Job Vacancy (ctd.)

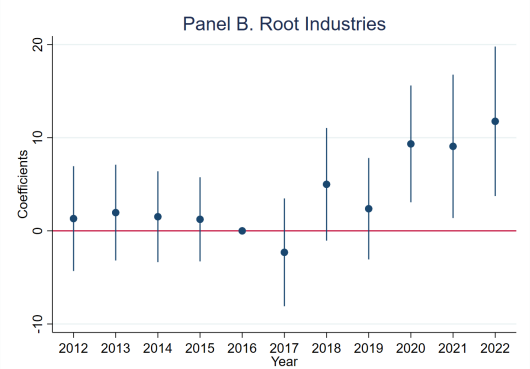
	(1) Overall	(2) Direct Exposure	(3) Partial Exposure	(4) No Exposure
Treatment Intensity × D_{2017}	-0.053***	-0.032*	-0.020*	-0.000
	(0.014)	(0.016)	(0.009)	(0.002)
Treatment Intensity × D_{2018}	-0.088***	-0.066**	-0.023	0.002
	(0.021)	(0.022)	(0.017)	(0.002)
Treatment Intensity × D_{2019}	-0.073***	-0.067**	-0.009	0.002
	(0.016)	(0.020)	(0.013)	(0.001)
Treatment Intensity × D_{2020}	-0.072***	-0.073***	-0.009	0.007
	(0.021)	(0.022)	(0.015)	(0.004)
Treatment Intensity × D_{2021}	-0.055**	-0.049**	-0.010	0.001
	(0.017)	(0.017)	(0.011)	(0.002)
Treatment Intensity × D_{2022}	-0.074**	-0.070**	-0.011	0.003
	(0.025)	(0.022)	(0.010)	(0.002)
2016 Mean of Dependent Variable	0.006	0.004	0.002	0.0002
N	2,497	2,497	2,497	2,497
R^2	0.92	0.94	0.82	0.65

- In 2019, 1 p.p larger treatment (91.7% ↑) → Job vacancy 0.067 p.p ↓ (18.6% ↓)
- 1% larger shock → 0.202% ↓

By Firm Size

Impacts on Value Added





Impacts on Value Added (ctd.)

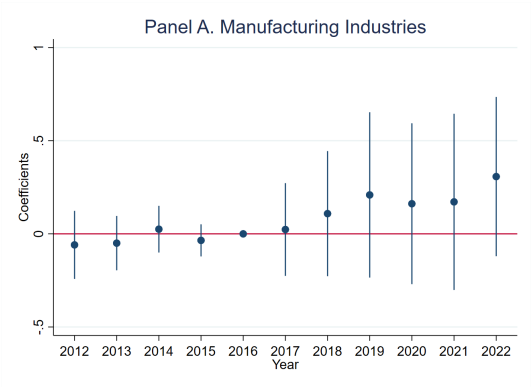
	(1) Manufacturing	(2) Root Industries
Treatment Intensity $\times$ D_{2017}	-0.151	-2.307
	(1.870)	(2.936)
Treatment Intensity $\times$ D_{2018}	-1.126	4.995
	(2.870)	(3.068)
Treatment Intensity $\times$ D_{2019}	-0.233	2.377
	(3.305)	(2.762)
Treatment Intensity $\times$ D_{2020}	4.321	9.336**
	(2.810)	(3.180)
Treatment Intensity $\times$ D_{2021}	2.467	9.072*
	(2.273)	(3.904)
Treatment Intensity $\times$ D_{2022}	2.338	11.759**
	(2.604)	(4.072)
2016 Mean of Dependent Variable	4.770	4.823
N	2,490	2,274
R^2	0.94	0.90

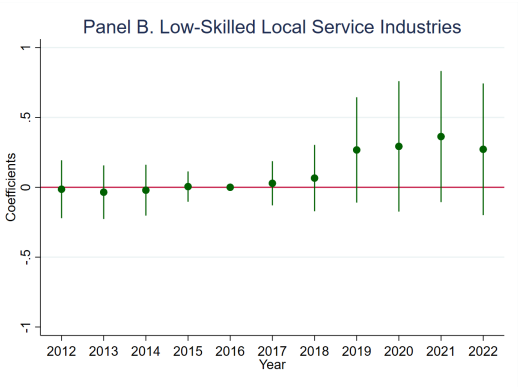
- In 2020, 1 p.p larger treatment (91.7% $\uparrow$) $\rightarrow$ Value Added 9.336% $\uparrow$ (elasticity $= 0.1018$)

Employment Effects

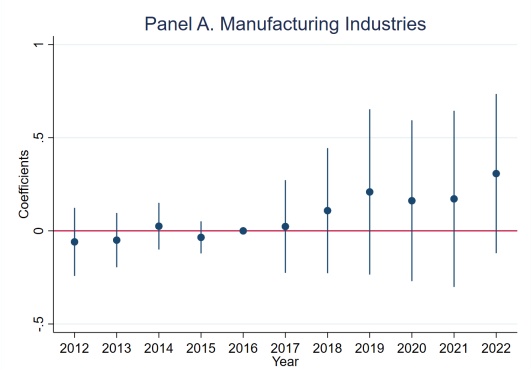
- Moretti (2010): Productivity increase in the tradable sector (manufacturing) may increase employment in non-tradable sector (local services).
- Note that E-7-4 visa does not explicitly increase in employment of eligible sectors.
  - We do find positive productivity effect though.
- Thus, we look at employment in manufacturing and service sectors.

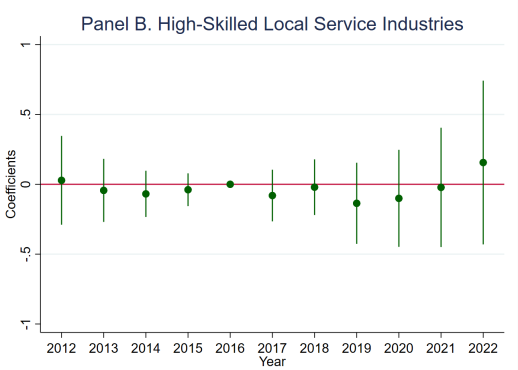
Impacts on Employment



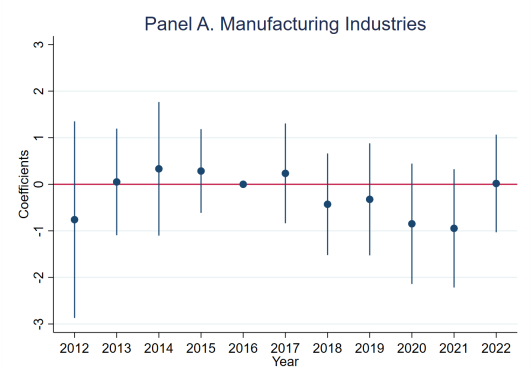


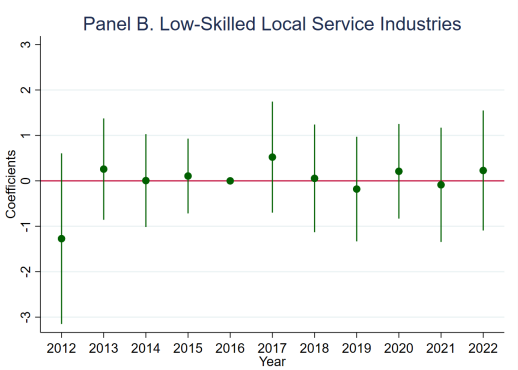
Impacts on Employment (ctd.)



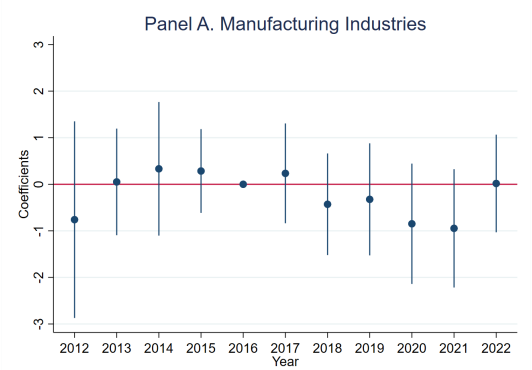


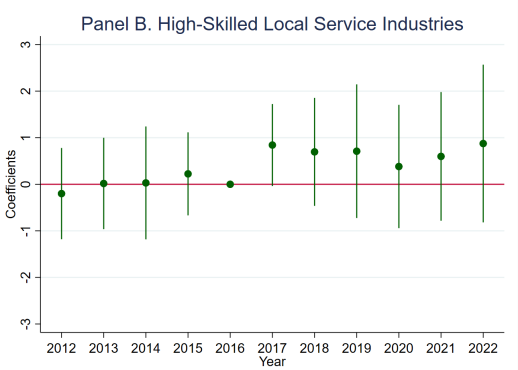
Impacts on Wage





Impacts on Wage (ctd.)



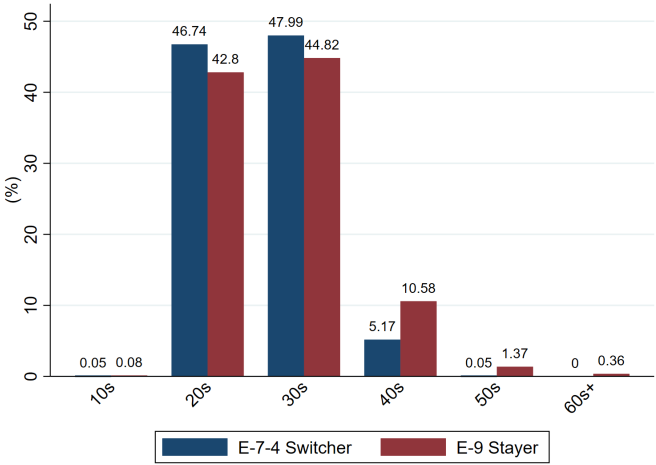


Mechanisms

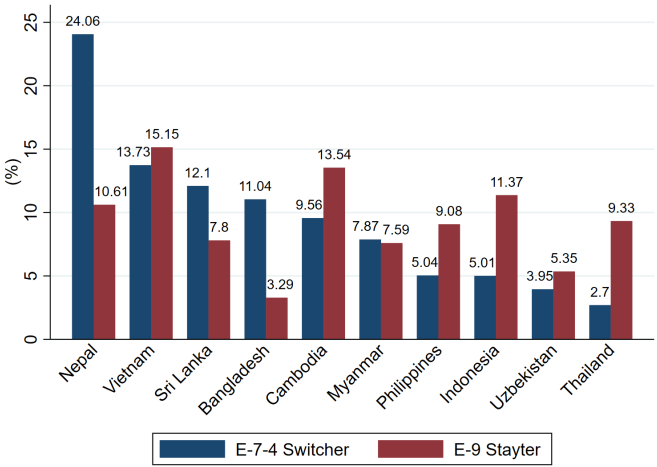
Mechanism

1. **Extension of stay** of workers who have acquired the E-7-4 visa
   - No loss of firm-specific human capital
2. **Positive selection** of high-quality workers through evaluation
   - Skill, age, productivity, etc
3. **Behavioral responses** among potential E-7-4 applicants
   - e.g., Job training participation ↑

Positive Selection: Age

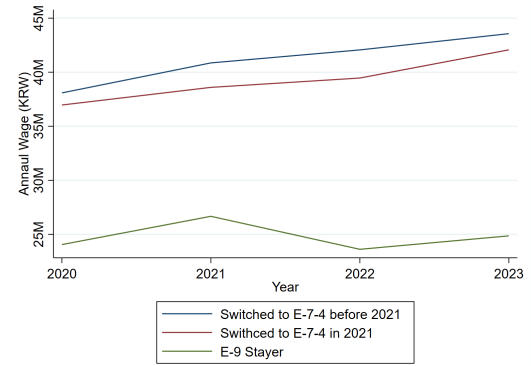


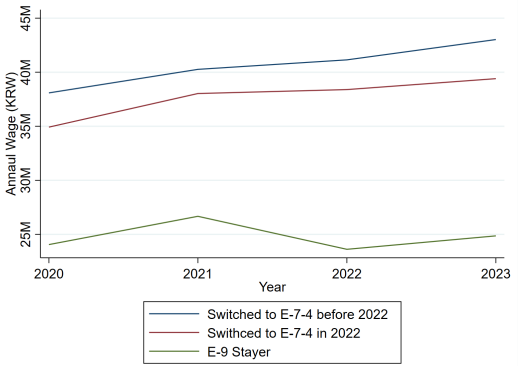
Positive Selection: Origin Country



Education Level

Positive Selection: Productivity (Proxied by Wage)





Behavioral Responses among Potential Applicants

For E-9 & H-2 workers, compare "Direct" industries with others

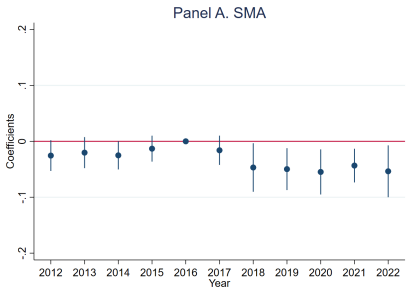
$$y_{i,t} = \Sigma_t \beta_t (Direct_i \times D_t) + \gamma^{'} X_i + \delta_{r(i)} + \eta_{j(i)} + \lambda_t + \epsilon_{i,t}$$

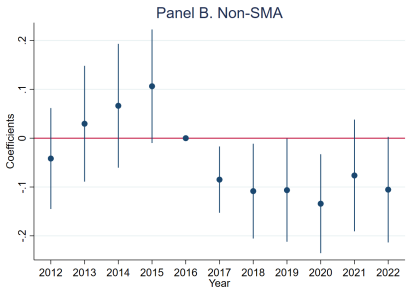
	(1) Job Training	(2) Cert Training	(3) Language	(4) Social Integration
Direct Exposure Industry $\times$ D_{2019}	0.044	-0.014	0.030	0.019
	(0.028)	(0.021)	(0.030)	(0.024)
Direct Exposure Industry $\times$ D_{2021}	0.052*	0.034	-0.003	0.027
	(0.029)	(0.022)	(0.031)	(0.024)
Direct Exposure Industry $\times$ D_{2023}	0.051*	0.002	-0.013	0.014
	(0.031)	(0.023)	(0.033)	(0.026)
2017 Mean of Dependent Variable	0.267	0.129	0.295	0.148
N	14,554	14,554	14,554	14,554
R^2	0.03	0.05	0.06	0.01

* p $<$ 0.10, ** p $<$ 0.05, *** p $<$ 0.01

- "Direct" Industries (Treatment) $\rightarrow$ Job training 5.2 p.p $\uparrow$ (19.5% $\uparrow$) in 2021

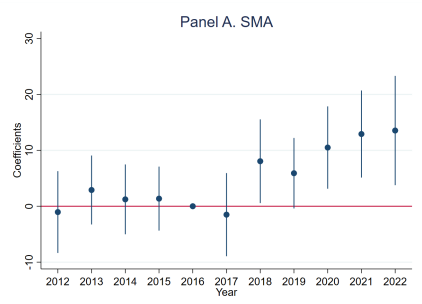
Heterogeneity (Job Vacancy)

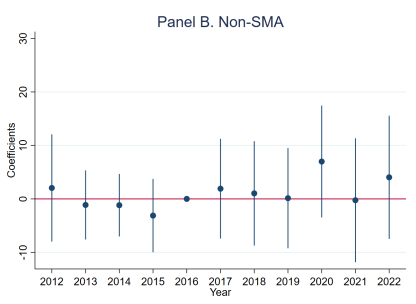




- Larger effect in Non-SMA which suffered from labor shortage
- In non-SMA, the increasing pre-trends in job vacancy reversed after the policy change.

Heterogeneity (Productivity)





- Larger productivity effect in SMA
- Perhaps agglomeration of highly educated workers in SMA drives the productivity increase.

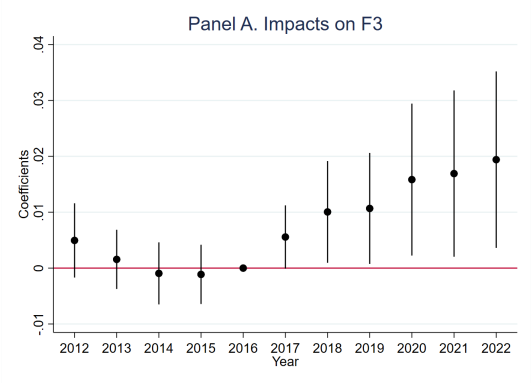
Conclusion

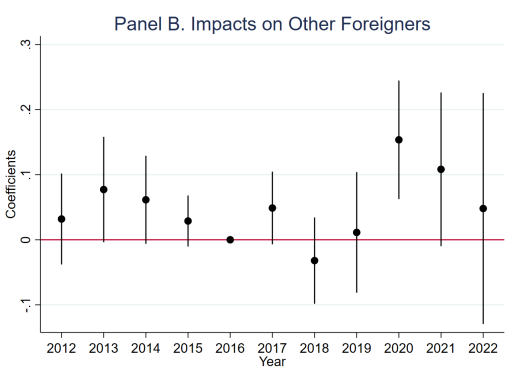
Conclusion

- In 2018, the new visa system (E-7-4) was introduced in Korea, which changes immigrants' stay from temporary to stable and prolonged.
- We examine the impacts of the new visa system on local outcomes;
  (1) labor shortage, (2) labor productivity, (3) employment, and wage
- Labor shortage significantly alleviated
- Positive productivity effect in targeted sectors (with limited local multiplier effect)
- Heterogeneity:
  - Relieving shortage in regions with labor shortage (no productivity increase)
  - Positive productivity effect in agglomeration economies (with smaller effect on job vacancy)

Thank you!

Validity





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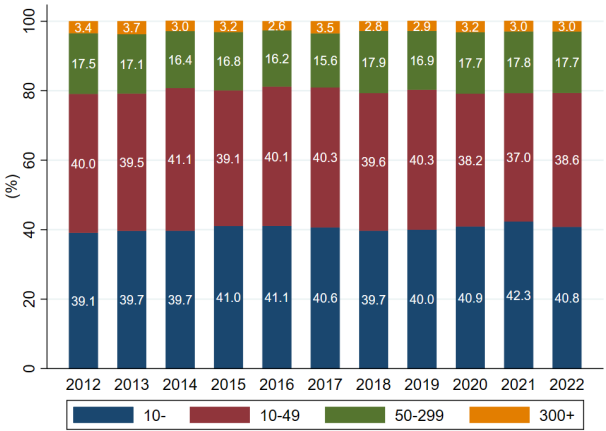
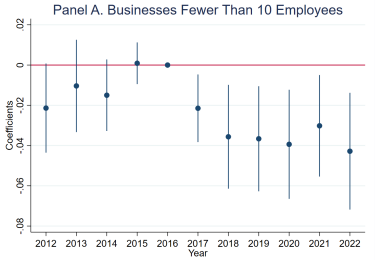
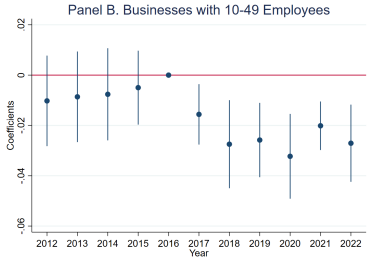
Foreign Employment by Firm Size

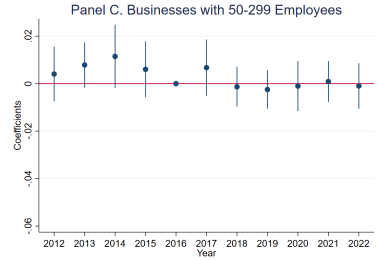


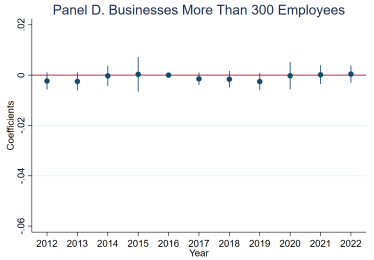
Source: Survey on Immigrant's Living Conditions and Labour Force, Statistics Korea

Impacts on Job Vacancy by Firm Size









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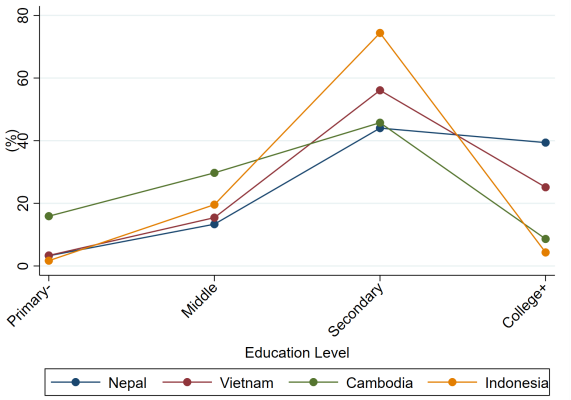
Impacts on Job Vacancy by Firm Size (ctd.)

	Direct Exposure Industries (by Firm Size)				
	(1)	(2)	(3)	(4)	(5)
	Total	10- Employees	10-49 Employees	50-299 Employees	300+ Employees
Treatment Intensity $\times$ D_{2017}	-0.032*	-0.021*	-0.016*	0.007	-0.001
	(0.016)	(0.009)	(0.006)	(0.006)	(0.001)
Treatment Intensity $\times$ D_{2018}	-0.066**	-0.036**	-0.027**	-0.001	-0.002
	(0.022)	(0.013)	(0.009)	(0.004)	(0.002)
Treatment Intensity $\times$ D_{2019}	-0.067**	-0.037**	-0.026***	-0.002	-0.003
	(0.020)	(0.013)	(0.007)	(0.004)	(0.002)
Treatment Intensity $\times$ D_{2020}	-0.073***	-0.039**	-0.032***	-0.001	-0.000
	(0.022)	(0.014)	(0.009)	(0.005)	(0.003)
Treatment Intensity $\times$ D_{2021}	-0.049**	-0.030*	-0.020***	0.001	0.000
	(0.017)	(0.013)	(0.005)	(0.004)	(0.002)
Treatment Intensity $\times$ D_{2022}	-0.070**	-0.043**	-0.027***	-0.001	0.000
	(0.022)	(0.015)	(0.008)	(0.005)	(0.002)
2016 Mean of Dependent Variable	0.004	0.002	0.001	0.0006	0.00006
N	2,497	2,497	2,497	2,497	2,497
R^2	0.94	0.86	0.96	0.87	0.57

Positive Selection: Origin Country and Education Level



Source: Survey on Immigrant's Living Conditions and Labour Force, Statistics Korea

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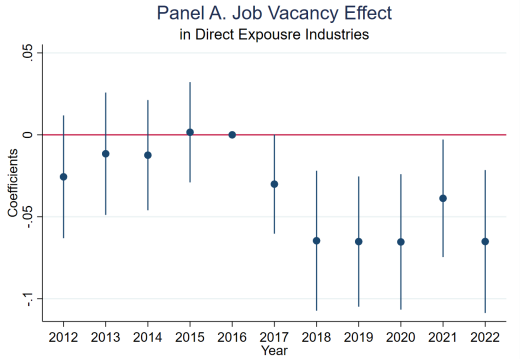
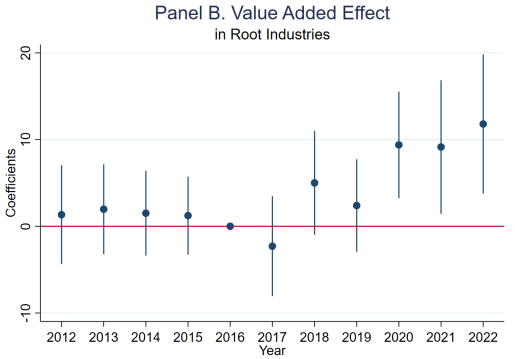
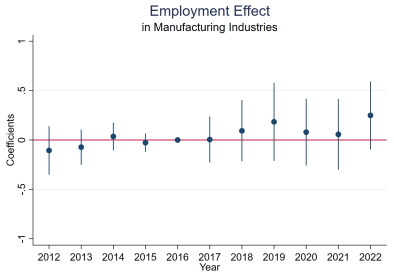
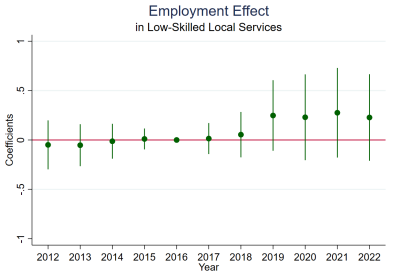
Robustness: Controlling for # of E-9 workers

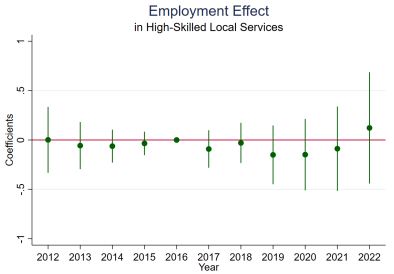




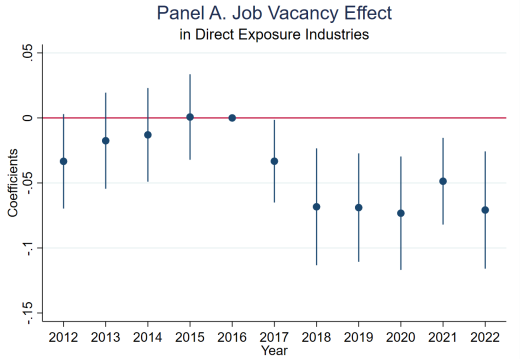
Robustness: Controlling for change in E-9 workers (employment)

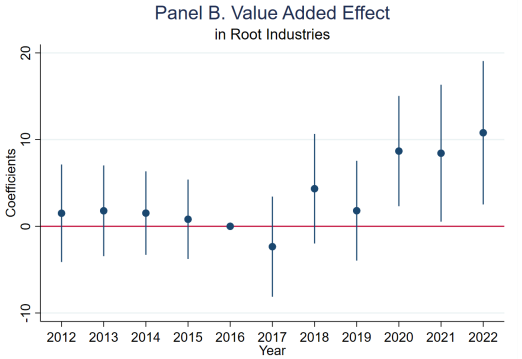




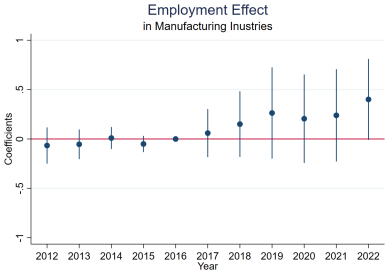


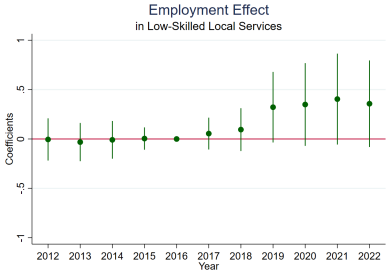
Robustness: Controlling for the Retirement Age Extension

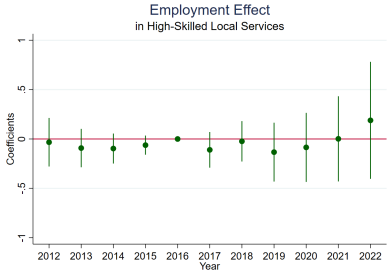




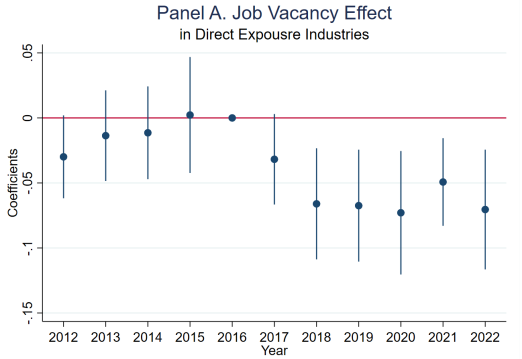
Robustness: Controlling for the Retirement Age Extension (employment)

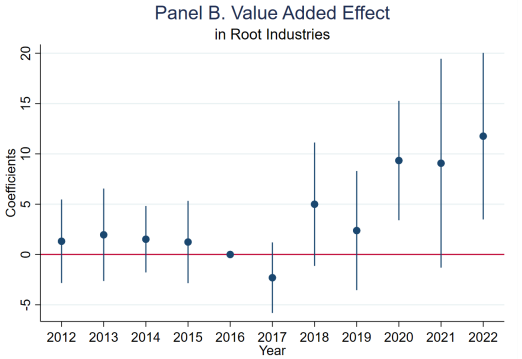






Robustness: S.E. Clustered at LZ Level





Robustness: S.E. Clustered at LZ Level (employment)