A Comparison of the Economic Effects of Immigration Scale in the United States and Japan: An Analysis of the Differences in GDP Growth from the Perspective of Immigration Concentration Degree

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Abstract

Based on panel data from 50 U.S. states and 47 prefecture-level regions in Japan between 2006 and 2018, this study employs a year-fixed-effects model to empirically analyze the impact of legal immigration on regional economic growth. After controlling for key variables such as population aging and unemployment rate, the results indicate that immigration size exerts a statistically significant positive effect on regional GDP growth in both countries, with a more pronounced marginal effect in the United States (elasticity coefficient: 0.068) compared to Japan (0.053). Both population aging and unemployment rate significantly hinder economic growth, particularly in Japan, where the adverse effects of demographic aging are especially salient. In terms of model fit, the U.S. sample demonstrates strong explanatory power ($R^2 = 0.906$), substantially higher than that of Japan ($R^2 = 0.611$). Further heterogeneity analysis based on the degree of migration concentration reveals that the positive association between immigration and economic growth remains stable in Japan, while exhibiting a weakening trend in certain U.S. regions. These findings suggest that migration policy formulation and implementation should be closely aligned with regional economic characteristics to enhance policy effectiveness and adaptability.

Keywords: Immigration policy； regional heterogeneity； population aging； unemployment rate

1. Introduction

Since the 1980s, many of Asia's least developed countries have begun to migrate to their wealthy neighbor Japan. Most empirical studies on the impact of migration on the labor market explain how migration has gradually balanced the host country's labor market. And as it describes the situation, it also explains what role the government plays in it and analyzes what kind of impact the enactment and implementation of an immigration policy will have on this group. But there are only a few studies that have examined and compared the differences between immigrant destinations, as well as the analysis of why that difference has occurred. I approach the differences between the two countries due to the differences in migration concentration from the perspective of the degree of migration concentration in the host country to illustrate the impact on the growth of the host country's GDP.

2. Literature Review

2.1 Theoretical Basis and Empirical Study of Migration and Economic Growth

Governments around the world use immigration policies to attract ideal human resources and recruit foreign workers to work in their countries to fill labor and skills shortages. The mainstream theory holds that immigration has a positive effect on economic growth by increasing the supply of labor, enriching human capital, promoting innovation and entrepreneurship, and expanding consumption [1][2]. [3] Scholars have pointed out that immigration not only fills labor shortages but also brings new skills and multiculturalism, boosts regional economic vitality, and globally, 68% of governments consider meeting labor market demands to be the fundamental reason for their current immigration policies [4]. The United States and Japan, as two of the world's largest economies, have had a profound impact on the global economic landscape in terms of their immigration policies and the scale of immigration. The United States has a long history of immigration as the world's largest host country, and the economic benefits brought by immigration to it are very significant [5], and its long history of immigration and the migration model from diversity to gradual restrictions [6] provide many references in practice. In the past 15 years, Japan has also emerged as a new immigrant country, facing the impact of an

aging population and low birth rate. The number of foreign workers reported by Japanese companies has increased by 2.7 times from 690,000 in 2011 to 1.82 million in 2022. This reflects the easing of regulations that restrict the entry of foreign workers and labor shortages. In 2020, the employment rate of foreign residents was 77%, comparable to that of native-born people [6]. However, foreign workers make up only a small fraction of Japan's workforce and are among the lowest in OECD countries [7]. Previous literature has discussed the wage benefits and self-actualization of immigrants from the perspective of immigrants from the same country to different countries. This paper examines the differences in the ways of generating benefits from the perspective of the immigrated country, and aims to partially supplement and expand the previous literature with recent data.

2.2 Discourse on Economic benefits and GDP growth

2.2.1 Economic Effects of immigration in the United States

Labour market structure: According to, U.S. immigrants are mainly engaged in low-skilled jobs such as construction, cleaning, maintenance, and food service, filling vacancies in the U.S. native workforce in these fields. However, this could also put some pressure on wage levels in these industries. [8] Especially for local workers with low educational attainment, the entry of immigrants can significantly reduce their wages. Studies show that immigration from 1980 to 2000 reduced the real wages of local workers without a high school education by 4-5%. [9]

GDP growth: Immigration has a significant long-term boosting effect on US GDP growth. Immigration not only brings in new technologies and innovations, but also boosts economic growth by increasing the supply of labor. [5] But one-off migration shocks increase GDP in the short term but lower per capita income, and per capita income returns to the original level in the long term; Persistent migration leads to a permanent decline in per capita income, and in the long term, highly skilled workers will be net accelerators of GDP growth. [10]

2.2.2 The economic Effects of Japanese immigration

The structure of the labor market: Immigrants in Japan are mainly concentrated in labor-intensive industries such as manufacturing, construction and services. Japan's immigration policy has been relatively conservative, but in recent years, with changes in the labor market, Japan has begun to gradually ease restrictions on immigrants. [11]

GDP growth: An aging population and labor shortages have become major obstacles to Japan's sustained economic growth. When discussing the impact of immigration policy on Japan, the Japanese government and business community generally believe that a moderate introduction of immigrants can help relieve labor market pressure and boost GDP growth. At the same time, it is emphasized that if foreign labor can be better attracted and integrated, it will not only fill the labor shortage in Japan, but also have a positive pull effect on the gross domestic product (GDP) through the economic activities of immigrants. The change in attitude among some of the Japanese public is based on the recognition that immigration can bring economic vitality and boost GDP growth. That is to say, the public's promotion of recognition of the rationality that "immigration promotes economic growth" helps society to accept immigration more widely. [12]

2.3 The impact of communities established under agglomeration degree and cultural differences on occupational mobility:

[13] et al. pointed out that the definition of immigrant communities or ethnic immigrant communities is based on the degree of aggregation of a single ethnic or immigrant group in a community or region, while [14] et al. pointed out that one of the differences among immigrant groups going to the United States and Japan is occupational mobility. Because the establishment of "communities" and the definition of "success" this sociocultural influence on occupational mobility leads to significantly lower occupational mobility among Japanese immigrants than in the United States.

2.4 A comparison of experiences in community building among immigrants in the United States and Japan at different levels of immigrant concentration

As two of the world's major developed economies, the United States and Japan have significant similarities and differences in immigration policies and community formation mechanisms. The United States, a traditional immigrant nation, has shifted from conservative flow control, corridors and racial homogeneity to a more diverse and open policy. It has a large number of mature immigrant communities, including Chinatowns, Koreatown and Latino communities, which are mostly composed of the same ethnic group. [15] et al. found that highly established immigrant communities not only facilitate the social integration of new immigrants, but also provide space and resources for local economic growth and entrepreneurship and innovation. In the United States, immigrant communities have strong economic self-organizing capabilities, business activity and employment-oriented programs are highly effective, and the rate of self-employment is high. [16] (see Fig.1)

These immigrants and workers are mainly concentrated in New York State, Florida, New Jersey and California, with the largest number in California.

Japan, on the other hand, has only gradually become an immigrant country since the late 20th century. Due to restrictive policies and the difficulty of cultural integration, the rate of migration in Japan has been relatively slow, and the degree of settlement and community organization is lower than that in the United States [17]. Although some cities, such as Nagoya and Kawasaki, have developed communities of skilled interns and naturalized Chinese, the overall support for economic growth mainly relies on labor replenishment rather than community self-organization. (See Fig.2) These migrants and laborers are mainly concentrated in Tokyo, Osaka Prefecture, Aichi Prefecture, Kanagawa Prefecture, with a particularly large proportion in Tokyo.

Figure 1. The proportion of (legal) immigrants received by each prefecture

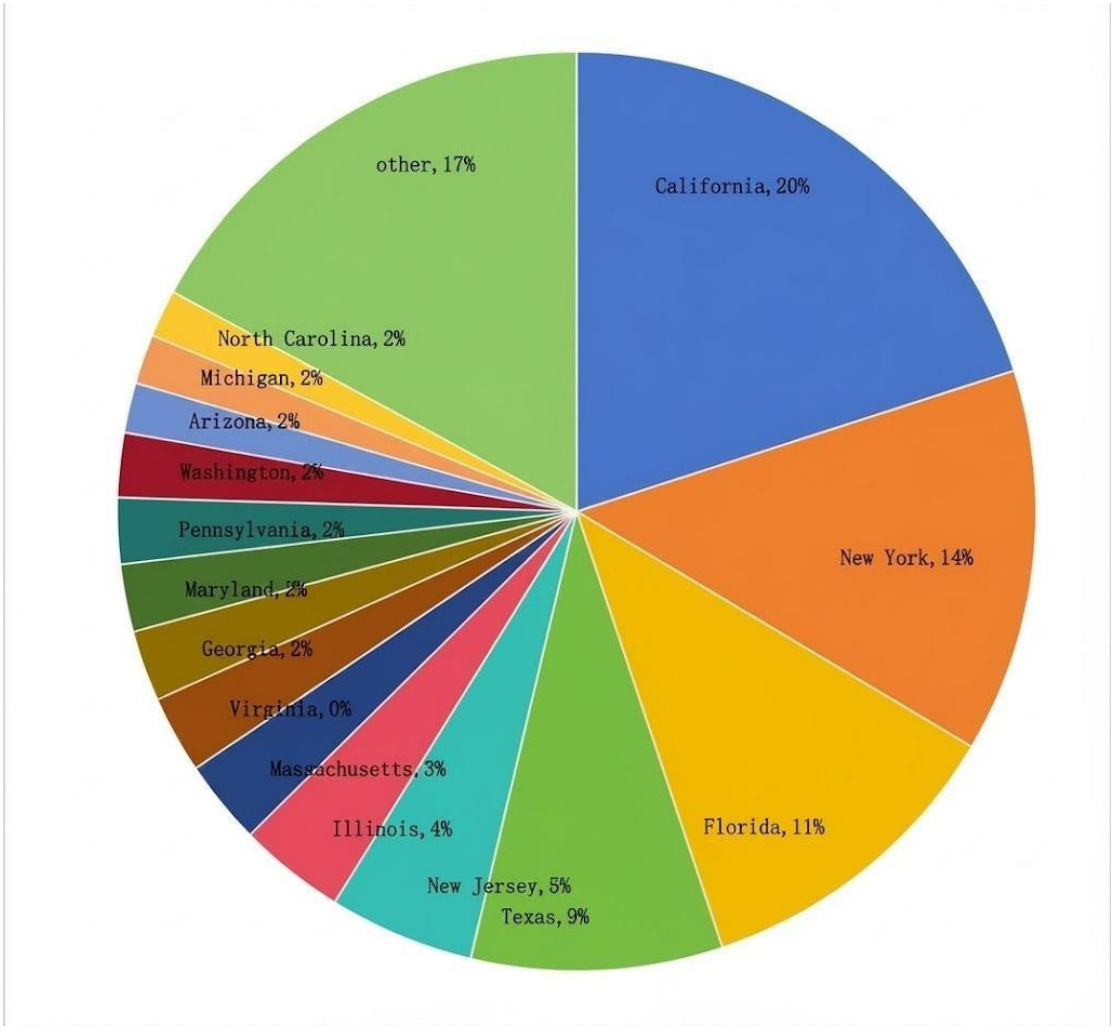
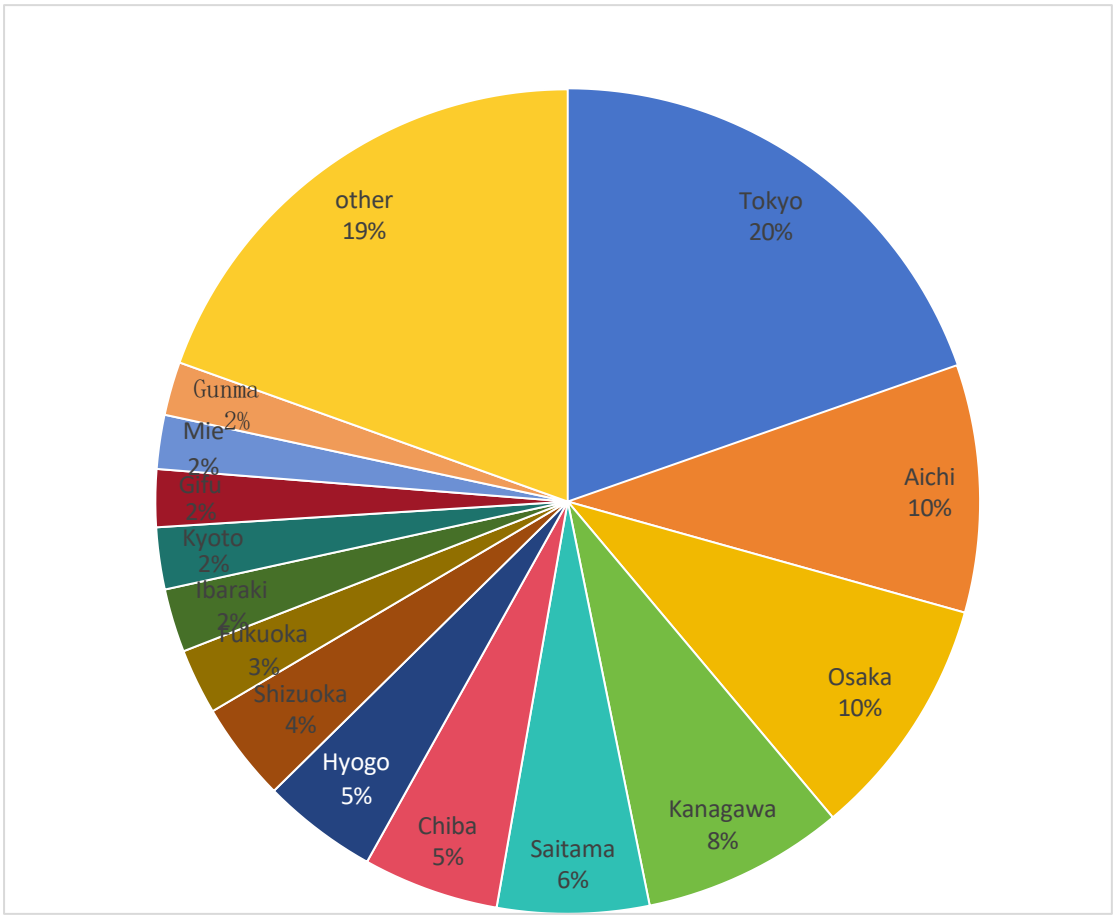


Figure 2. The proportion of (legal) immigrants received by each state



Data source: The average number of immigrant residents in each state (prefecture) from 2006 to 2018 from the U.S. Bureau of Labor Statistics and the Ministry of Health, Labor and Welfare.

3. Theoretical analysis and Mechanism assumptions

3.1 Mechanism Assumptions

H1: The economic growth benefits brought by Japanese immigrants are lower than those in the United States.

H2: Population aging and unemployment have a significant negative impact on economic growth and are included as control variables in the empirical model.

H3: Heterogeneity by region and year is controlled by fixed effects.

3.2 Econometric model setup

Based on the above mechanism assumptions, this paper sets up the following regional panel fixed effect regression model:

$$\ln(GDP_{it}) = \alpha + \beta_1 \cdot \ln(immigrants_{it}) + \beta_2 \cdot coefficient\ of\ aging_{it} + \beta_3 \cdot Unemployment\ rate_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

Among them:

$ln\ GDP_{it}$	*The logarithm of the regional GDP of the i-th region in the t-th year* (*dependent variable*)
$ln\ immigrants_{it}$	The logarithm of the number of immigrants in region i in year t (the core explanatory variable)
$coefficient\ of\ aging_{it}$	*The coefficient of population aging in the i-th region in the t-th year* (*control variable*)
$Unemployment\ rate_{it}$	*The unemployment rate in region i in year t* (*control variable*)
μ_i	*Regional fixed effects*, *controlling for unobservable regional differences*.
λ_i	*Year fixed effects*, *controlling for macroeconomic and policy shocks*
ε_{it}	disturbance term

Note: The unemployment rate figures in Japan are regional figures by region, such as Hokkaido, Tohoku, northern Kanto, Southern Kanto, Hokuriku, Tokai, Kinki, Chugoku, Shikoku, Kyushu.

3.3 Analysis of Empirical Results

3.3.1 Economic Benefit Model

In the model estimation process, fixed-effects and random-effects models are first used for analysis, and then Hausman test is used to select the final measurement method.

Table 1. Fixed-effects (Year Fixed) Model and random effects model of Japan

	(1)	(2)	(3)	(4)
	mean			
VARIABLES	(sd)	FE	RE	FE+Year
ln_GDP	29.58			
	(0.851)			
ln_immigrants	9.923	0.0507 * * *	0.112 * * *	0.0530 * * *
	(1.232)	(0.0116)	(0.0133)	(0.0136)
coeffcientofaging	0.261	0.157 * *	0.186 * *	0.804 * * *
	(0.0366)	(0.0672)	(0.0812)	(0.263)
Unemployment_rate	0.0388	3.146 * * *	2.746 * * *	1.511 * * *
	(0.00945)	(0.226)	(0.272)	(0.438)
2006b.year	0.0769			
	(0.267)			
2007.year	0.0769			0.0145 * * *
	(0.267)			(0.00536)
2008.year	0.0769			0.0192 * * *
	(0.267)			(0.00596)
2009.year	0.0769			0.0284 * * *
	(0.267)			(0.00792)
2010.year	0.0769			0.00248
	(0.267)			(0.00823)
2011.year	0.0769			0.0136 *
	(0.267)			(0.00793)
2012.year	0.0769			0.0111
	(0.267)			(0.00958)
2013.year	0.0769			0.0347 * * *
	(0.267)			(0.0118)
2014.year	0.0769			0.0267 *
	(0.267)			(0.0145)
2015.year	0.0769			0.0435 * * *
	(0.267)			(0.0168)
2016.year	0.0769			0.0505 * * *
	(0.267)			(0.0190)
2017.year	0.0769			0.0686 * * *
	(0.267)			(0.0211)
2018.year	0.0769			0.0741 * * *
	(0.267)			(0.0232)
Constant		29.24 * * *	28.62 * * *	29.30 * * *
		(0.122)	(0.149)	(0.161)

Observations	611	611	611	611
R-squared		0.511		0.611
Number of region_id	47	47	47	47

The model in this paper uses region-year strongly balanced panel data and uses fixed effects to eliminate unobstructed regional and temporal heterogeneity to ensure the robustness of the estimates. For the rationality of the model setting, the Hausman test is used to determine that fixed effects are the final measurement method.

The Hausman test results are as follows:

	---- Coefficients ----		
(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
fe	re	Difference	Std. err.
ln_immigra~s	.0506696	.1121634	-.0614937	.0045168
coeffcient~g	-.1567641	-.1856878	.0289238	.0034957
Unemployme~e	-3.145683	-2.746449	-.3992337	.0288416

b = Consistent under H0 and Ha; obtained from xtreg.

B = Inconsistent under Ha, efficient under H0; obtained from xtreg.

Test of H0: Difference in coefficients not systematic

$$chi2(3) = (b-B)'[(V\_b-V\_B)^{(-1)}](b-B)= 193.75$$

$$Prob > chi2 = 0.0000$$

The Hausman test had a chi2 statistic of 193.75, corresponding to a p value of 0.0000, which was very significant. This suggests that under significance tests, the null hypothesis (the null hypothesis is that the coefficients of each variable do not differ significantly between the fixed-effects and random-effects models) should be rejected, that is, the coefficients differ significantly between the two models, and the fixed-effects model should be adopted.

Specifically, the estimated coefficients of the main variables ln_immigrants, coefficient of aging, and Unemployment rate are significantly different under the fixed effects and random effects models, and the standard errors of the differences are small.

Model explanation under fixed effects:

(1) (See Table1-1) Immigrant scale effect: In the Japanese sample, the regression coefficient of ln_immigrants on ln_GDP is consistently positive and highly significant (as in the year fixed effects model, the coefficient is approximately 0.0530, $P<0.01$), indicating that the increase in immigrant population has a certain promoting effect on the regional economy.

(2) Population aging effect: The coefficient of aging is significantly negative, which is about -0.804 in the annual fixed effects model), reflecting the significant inhibitory effect of population aging on economic growth. It indicates that the low birth rate and aging society brought about by demographic changes are significant constraints on economic growth in Japan.

(3) Impact of unemployment rate: The Unemployment_rate is negative and highly significant, consistent with economic theory, indicating that a sluggish labor market weakens regional economic growth performance, in line with basic economic theory.

(4) Year effect and model fitting: With the introduction of the year fixed effect, the explanatory power of the model is significantly enhanced (about 0.611), indicating that regional economies are more affected by macroeconomic cycles and event shocks, and the explanatory level of the model is enhanced. The results of the dummy variables for each year are shown in the table, and some years have a positive effect on the economy, reflecting cyclical fluctuations.

Table 2. Fixed-effects (Year Fixed) Model and random effects model of USA

VARIABLES	(1) mean (sd)	(2) FE	(3) RE	(4) FE+Year
ln_GDP	25.98			
	(1.034)			
ln_immigrants	8.929	0.238 * * *	0.376 * * *	0.0681 * * *
	(1.442)	(0.0225)	(0.0206)	(0.0185)
coeffcientofaging	0.143	7.527 * * *	7.424 * * *	5.734 * * *
	(0.0211)	(0.217)	(0.237)	(0.535)
Unemployment_rate	0.0588	0.339 * *	-0.196	1.836 * * *
	(0.0221)	(0.152)	(0.165)	(0.197)
2006b.year	0.0769			
	(0.267)			
2007.year	0.0769			0.0634 * * *
	(0.267)			(0.00841)
2008.year	0.0769			0.112 * * *
	(0.267)			(0.00829)
2009.year	0.0769			0.157 * * *
	(0.267)			(0.0116)
2010.year	0.0769			0.215 * * *
	(0.267)			(0.0120)
2011.year	0.0769			0.251 * * *
	(0.267)			(0.0116)
2012.year	0.0769			0.304 * * *
	(0.267)			(0.0119)
2013.year	0.0769			0.351 * * *
	(0.267)			(0.0126)
2014.year	0.0769			0.395 * * *
	(0.267)			(0.0136)
2015.year	0.0769			0.427 * * *
	(0.267)			(0.0154)
2016.year	0.0769			0.458 * * *
	(0.267)			(0.0182)
2017.year	0.0769			0.516 * * *
	(0.267)			(0.0198)
2018.year	0.0769			0.580 * * *
	(0.267)			(0.0219)
Constant		22.80 * * *	21.57 * * *	26.01 * * *
		(0.204)	(0.196)	(0.212)
Observations	650	650	650	650
R-squared		0.742		0.906
Number of region_id	50	50	50	50

The Hausman test results are as follows:

	---- Coefficients ----			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fe	re	Difference	Std. err.
ln_immigra~s	.2384603	.3763419	-.1378816	.0136105
coeffcient~g	7.527308	7.424329	.1029785	.018392
Unemployme~e	-.3394704	-.1956793	-.1437911	.0163654

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b = Consistent under H0 and Ha; obtained from xtreg.

B = Inconsistent under Ha, efficient under H0; obtained from xtreg.

Test of H0: Difference in coefficients not systematic

$$chi2(3) = (b-B)'[(V\_b-V\_B)^{(-1)}](b-B)= 110.48$$

$$Prob > chi2 = 0.0000$$

The Hausman test had a chi2 statistic of 110.48, corresponding to a p value of 0.0000, which was very significant. This suggests that the null hypothesis should be rejected under the significance test (the null hypothesis is that the coefficients of each variable do not differ significantly under the fixed-effect and random-effect models), And there are significant differences in the regression coefficients of variables (ln_immigrants, coefficient of aging, Unemployment rate) under the two models, for example, ln_immigrants is 0.238 under the fixed effects model. In the random effects model, it was 0.376, with a difference of about -0.138 and a smaller standard error. That is, the coefficients differ significantly between the two models, and the fixed effects model should be used.

Model explanation under fixed effects:

(See Table1-2)The estimated coefficients of the main variables ln_immigrants, coefficient of aging, and Unemployment rate were significantly different in the fixed-effects and random-effects models, and the standard errors of the differences were small

(1) Immigrant scale effect:

In the US sample, the regression coefficient of ln_immigrants on ln_GDP is 0.0681 (fixed effect (year fixed), highly significant), indicating that the increase in immigrant population has a significant driving effect on regional economic growth.

(2) Impact of population aging:

The regression coefficient of the coefficient of aging under the fixed effect (fixed year) model term is -5.734, which is highly significant. This indicates that population aging has a relatively obvious inhibitory effect on economic growth, which is in line with the adverse effects of low birth rate and reduced labor force on the economy.

(3) Unemployment rate effect:

The regression coefficient of Unemployment_rate is -1.836, and it is statistically highly significant. This reflects that an increase in unemployment in the market directly compresses the space for regional GDP growth, in line with classical labor market theory.

(4) Year effect and model fitting:

With the introduction of the year fixed effect, the explanatory power of the model was significantly enhanced (R-squared increased from 0.742 to 0.906), and most of the dummy variable coefficients for each year were positive and significant, indicating that the overall U.S. economic environment continued to improve during the sample period, and the goodness of fit of the regression model was also improved.

3.3.2 Cross-sectional analysis

(1) Differences in migration size and economic benefits

In the US sample, the regression coefficient of the ln_immigrants variable was approximately 0.0681 under the fixed-effect (year fixed) model, which was statistically significant. The migration coefficient for the Japanese sample under the same model was only 0.0530, which was equally significant but overall less resilient. This suggests that the immigrant population has a significantly stronger impact on GDP in the United States than in Japan.

This difference, on the one hand, reflects the larger volume of immigrants in the United States, the more open labor market, and the faster integration of immigrants into the economic system and the creation of new jobs and output value. On the other hand, Japan has a limited immigrant population, policy barriers and an aging population, and immigrants have failed to effectively alleviate the shortage of labor, resulting in limited economic benefits per immigrant.

(2) Effects of population aging and unemployment rate

In both the United States and Japan, the coefficient of aging and the coefficient of Unemployment_rate are negative and significant, structurally suppressing economic growth. The aging shock is more pronounced in Japan (-0.804 compared to -5.734 in the US), indicating that Japan is in a more severe stage of an aging society. The negative effects of the unemployment rate also show different sensitivities in the two countries. The diversified creation of the US labor market buffers some of the economic losses caused by unemployment, and the Japanese government should pay more attention to diversification and broaden channels when introducing immigrants.

(3) Model fit and year effect

After the introduction of the year fixed effect, the R-squares of the regression models in both the United States and Japan improved significantly, indicating that the global economic environment and cyclical shocks have some explanatory power for regional GDP in both countries. The U.S. model is more explanatory ($R^2 \approx 0.906$) and the Japanese model ($R^2 \approx 0.611$), indicating that the overall stability of the U.S. economy and the representativeness of immigration data are higher.

3.3.3 Conclusions and Implications of the Horizontal comparison

There is significant heterogeneity in the mechanism effect of immigrant populations on economic growth between the United States and Japan. In the United States, due to its large immigrant population, inclusive policies and resilient labor market, the economic benefits of immigrants are more significant, effectively curbing the effects of population aging and structural unemployment; Japan, on the other hand, has a weaker economic dividend due to a limited number of immigrants, tightened policies and an aging population.

3.4 Economic comparison of the agglomeration effect of migrants

In the previous model estimation process, replace the population size data of the previous immigrants variable with the ratio of immigrant population to local population to reflect the degree of aggregation of immigrant population in this area.

Table 3. Fixed-effects (Year Fixed) Model and random effects model of Japan(The immigrants variable has been converted)

	(1)	(2)	(3)	(4)
VARIABLES	mean (sd)	FE	RE	FE+Year
ln_GDP	29.58			
	(0.851)			
ln_immigrants	-4.555	0.0404 * * *	0.0462 * * *	0.0393 * * *
	(0.642)	(0.0122)	(0.0125)	(0.0145)
coeffcientofaging	0.261	0.178 * * *	0.189 * * *	0.919 * * *
	(0.0366)	(0.0679)	(0.0701)	(0.261)
Unemployment_rate	0.0388	3.215 * * *	3.188 * * *	1.466 * * *
	(0.00945)	(0.231)	(0.238)	(0.443)
2006b.year	0.0769			
	(0.267)			
2007.year	0.0769			0.0154 * * *
	(0.267)			(0.00539)
2008.year	0.0769			0.0176 * * *
	(0.267)			(0.00599)
2009.year	0.0769			0.0270 * * *
	(0.267)			(0.00801)
2010.year	0.0769			0.00389
	(0.267)			(0.00829)
2011.year	0.0769			0.0148 *
	(0.267)			(0.00798)
2012.year	0.0769			0.0130
	(0.267)			(0.00962)
2013.year	0.0769			0.0378 * * *
	(0.267)			(0.0119)
2014.year	0.0769			0.0313 * *
	(0.267)			(0.0145)
2015.year	0.0769			0.0497 * * *

	(0.267)			(0.0168)
2016.year	0.0769			0.0583 * * *
	(0.267)			(0.0189)
2017.year	0.0769			0.0780 * * *
	(0.267)			(0.0211)
2018.year	0.0769			0.0852 * * *
	(0.267)			(0.0231)
Constant		29.93 * * *	29.96 * * *	30.03 * * *
		(0.0586)	(0.110)	(0.0803)
Observations	611	611	611	611
R-squared		0.504		0.605
Number of region_id	47	47	47	47

The Hausman test results are as follows:

hausman fe re, sigmamore

	---- Coefficients ----			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fe	re	Difference	Std. err.
ln_immigra~s	.0404323	.0462125	-.0057801	.0010583
coeffcient~g	-.1776991	-.1886473	.0109483	.0019075
Unemployme~e	-3.214652	-3.1885	-.026152	.0058634

b = Consistent under H0 and Ha; obtained from xtreg.

B = Inconsistent under Ha, efficient under H0; obtained from xtreg.

Test of H0: Difference in coefficients not systematic

$$chi2(3) = (b-B)'[(V\_b-V\_B)^{(-1)}](b-B)= 39.95$$

$$Prob > chi2 = 0.0000$$

The Hausman test had a chi2 statistic of 39.95, corresponding to a p value of 0.0000, which was very significant. This suggests that under significance tests, the null hypothesis (the null hypothesis is that the coefficients of each variable do not differ significantly between the fixed-effects and random-effects models) should be rejected, that is, the coefficients differ significantly between the two models, and the fixed-effects model should be adopted.

Table 4. Fixed-effects (Year Fixed) Model and random effects model of USA(The immigrants variable has been converted)

	(1)	(2)	(3)	(4)
VARIABLES	mean (sd)	FE	RE	FE+Year
ln_GDP	26.96			
	(1.016)			
ln_immigrants	-5.078	0.119	0.137	0.171 *
	(0.785)	(0.0975)	(0.0960)	(0.0921)
coeffcientofaging	0.146	9.586 * * *	9.602 * * *	3.404 * *
	(0.0212)	(0.460)	(0.466)	(1.657)
Unemployment_rate	0.0615	0.675 * * *	0.666 * *	2.144 * * *
	(0.0232)	(0.255)	(0.259)	(0.512)

2006b.year	0.132			
	(0.340)			
2007.year	0.0769			0.0436 * *
	(0.268)			(0.0169)
2008.year	0.0769			0.103 * * *
	(0.268)			(0.0177)
2009.year	0.0769			0.155 * * *
	(0.268)			(0.0285)
2010.year	0.0769			0.204 * * *
	(0.268)			(0.0317)
2011.year	0.0769			0.230 * * *
	(0.268)			(0.0296)
2012.year	0.0659			0.275 * * *
	(0.250)			(0.0312)
2013.year	0.0659			0.306 * * *
	(0.250)			(0.0324)
2014.year	0.0659			0.334 * * *
	(0.250)			(0.0350)
2015.year	0.0659			0.367 * * *
	(0.250)			(0.0406)
2016.year	0.0769			0.409 * * *
	(0.268)			(0.0485)
2017.year	0.0769			0.454 * * *
	(0.268)			(0.0534)
2018.year	0.0659			0.507 * * *
	(0.250)			(0.0603)
Constant		26.20 * * *	25.99 * * *	26.48 * * *
		(0.490)	(0.529)	(0.375)
Observations	91	91	91	91
R-squared		0.871		0.952
Number of region_id	12	12	12	12

The Hausman test results are as follows:

hausman fe re, sigmamore

	---- Coefficients ----			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fe	re	Difference	Std. err.
ln_immigra~s	.119177	.1368461	-.0176691	.0236711
coeffcient~g: 9.5857 9.601571 --.0158703.0224868				
Unemployme~e	-.6746624	-.6655815	-.0090809	.0057826

b = Consistent under H0 and Ha; obtained from xtreg.

B = Inconsistent under Ha, efficient under H0; obtained from xtreg.

Test of H0: Difference in coefficients not systematic

chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)= 5.23

Prob > chi2 = 0.1555

The results of the Hausman test showed chi2(3)=5.23, p value 0.1555, did not reject the null hypothesis of "no systematic difference in coefficients", indicating that the random effects (RE) model is appropriate.

3.4.1 Analysis of Regression Results and Implications of Agglomeration Effects

(See Table2-1)The regression results showed that the fixed effects panel regression under the Japanese data indicated a significant positive correlation between migration growth and economic growth (coefficient 0.039, p=0.007), but both the degree of aging and the unemployment rate showed adverse effects on GDP (coefficients -0.919 and -1.466 respectively, both highly significant). The significance of the annual dummy variables reflects the fluctuations in the economic environment in each year. The model has a high intra-group fit, a strong fixed effect, is in line with the characteristics of panel data, and the research conclusion has strong robustness. (See Table2-2)Panel regression analysis of the random effects model in the U.S. data showed that unemployment had a significant negative impact on GDP (coefficient =-0.666, p=0.010), but the aging coefficient showed a strong positive correlation (coefficient =9.602, p<0.001). The impact of the number of migrants on GDP was negative but not significant (p=0.154). The model as a whole was significant, with a strong ability to explain intra-group variations. In this study, the data used was from legal immigrants, while the proportion of illegal immigrants in the United States was higher, which led to the amplification of the aggregation degree indicator in regions with weaker economies or active informal economies, thus showing a negative effect. In contrast, Japan has a relatively low base of immigrants, and immigrants are mainly concentrated in economically developed regions, thus showing a stable positive effect.

4. Conclusions and Policy Recommendations

4.1 Main Conclusions

The increase in the number of immigrants per unit significantly boosted economic growth in Japan and the United States, with the United States playing a more prominent role. Population aging and unemployment have a significant inhibitory effect on economic growth, with Japan being more affected by aging. Economic fluctuations and changes in the macro environment have a significant impact on regional economic performance. There are significant differences between Japan and the United States in terms of the economic benefits of immigration and regional distribution.

4.2 Policy Recommendations

United States

Stabilize and optimize immigration policies, focusing on guiding the positive role of immigrants in economically weak regions. At the same time, increase measures to lower the unemployment rate and enhance the utilization of the labor force.

Japan

The scale of migration should be expanded in an orderly manner, encouraging skilled and young migrants to gather in regions with a shortage of labor and great potential for economic development, while strengthening measures to address an aging population and easing restrictions on the economy.

4.3 Common Recommendations

Immigration policies should dynamically respond to changes in the economic environment, enhance their adaptability and adjustment capabilities, and at the same time encourage the coordination and cooperation between immigration policies and economic development goals, so as to fully leverage the positive role of immigration in economic growth and make full contributions to economic development.

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