The Immigration Equation: A 50-State Analysis of Immigrants' Impact on U.S. Private-Sector GDP

Baishali Rahman, MS, MBA
Challey Institute Research Specialist

Richard Feir, MS
Challey Institute Research Specialist

John Bitzan, PhD
Challey Institute Menard Family Director

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ABSTRACT

The association between immigration and economic growth remains a long-debated issue among researchers. However, the relationship has rarely been explored at the subnational level, especially when differences in U.S. state-level socioeconomic and demographic structures are considered. In this paper, we examine the effect of immigration on state-level real private-sector GDP across all 50 U.S. states using a flexible translog production function estimated via ordinary least squares. The empirical framework isolates the impact of immigrant and native-born populations on private-sector GDP and incorporates economic freedom, college attainment, industry composition, time, and state fixed effects. Using annual data from 2008 to 2023, our study finds that both immigrant and native-born populations contribute positively to private-sector GDP, with the native-born population's contributions rising over time. The empirical analysis further shows that a 1 percent increase in the immigrant population is associated with an approximately 0.15% increase in state private-sector GDP at the point of means, while the corresponding elasticity for the native-born population is higher. Finally, simulation analysis illustrates substantial cross-state heterogeneity, showing that the output effects of immigration are generally stronger in states with smaller immigrant populations and more economic freedom, and weaker in immigrant-heavy states and those with less economic freedom.

Baishali Rahman
Sheila and Robert Challey Institute for
Global Innovation and Growth
North Dakota State University
baishali.rahman@ndsu.edu

Richard Feir
Sheila and Robert Challey Institute for
Global Innovation and Growth
North Dakota State University
richard.feir@ndsu.edu

John Bitzan
Sheila and Robert Challey Institute for
Global Innovation and Growth
North Dakota State University
john.bitzan@ndsu.edu

1 Introduction

Net international migration for the U.S. is expected to drop from 2,732,000 in 2024 to 321,000 in 2026 (U.S. Census Bureau, 2026). One report by the Brookings Institution (Edelberg et al., 2026) estimates negative net migration for the U.S. in 2025. Factors include decreased green cards awarded, more countries added to full or partial travel bans, reduced refugee admissions, reduced asylum grants, and elimination of Biden-era humanitarian parole programs.

Although recent policy changes are based on a number of concerns, a major stated justification for the increased restrictiveness of immigration policy is a perceived negative economic effect of immigration. Advocates of tighter restrictions on immigration claim that immigrants utilize state-funded public services like healthcare and education without contributing much to the tax base, and that they reduce wages and employment opportunities for native-born workers (Roy, 2025).

On the other hand, opponents of the major restrictions point to benefits from immigration, many of them economic. They note the crucial role immigrants play in many industries, their outsized impact on innovation and entrepreneurship, and the large positive impact they have on GDP due to their impact on the demand for goods and services and their enhancement of national productivity (Roy, 2025).

The importance of understanding immigration's impact on the U.S. economy is magnified by demographic factors. According to the U.S. Congressional Budget Office, the percentage of the U.S. population that is 65 or older is expected to increase from the current 19% to 24% by 2056, and U.S. population would begin to decrease in 2030 without any immigration (CBO, 2026). This trend indicates a reduction in the working-age population, and therefore, less contribution to programs such as Social Security, a reduction in the supply of younger workers, who are typically associated with innovation, and a decrease in the number of people needed to provide care for an aging population. Moreover, recent labor market tightness demonstrated the restraining impact that insufficient workers can have on several industries (Melhorn & Hoover, 2026).

As the nation struggles to define the future role of immigrants in the U.S. economy, an economic analysis of their impact on economic output is crucial. While many papers have examined immigration's impact on wages, unemployment, the use of public funds, and innovation, to date, no study has quantified its impact on state private-sector GDP. This study estimates the impact of immigration on state private-sector GDP using data from 2008 to 2023 and simulates the percentage and GDP gains with increases in the immigrant population.

2 Literature Review

Previous studies provide mixed evidence regarding the relationship between immigration and economic growth (GDP). Some studies find negative effects of low-skilled immigration on wages and employment (Borjas & Ramey, 1995). Consistent with the neoclassical growth model, Jones (2002) argues that an increase in the immigrant population reduces per capita economic growth (based on a model with constant returns to scale imposed and assuming capital-labor ratio decreases with more immigration). Orefice (2010) identifies an overall negative effect of migration on per capita GDP, despite a positive effect of high-skilled migration (Orefice, G., 2010). However, more recent studies find a positive relationship between immigration and economic growth, as well as other indicators, such as productivity and economic prosperity (Afzal & Kalra, 2024; Boubtane et al., 2013, 2016; A. Islam, 2007).

Researchers also identify several reasons for the positive impact of Immigration on GDP growth in the host countries, including the technological boost that immigrants bring (Hunt & Gauthier-Loiselle, 2010), higher growth in innovation (Kerr & Lincoln, 2010; Terry et al., 2026), human capital additions (Orefice, G., 2010), and the diversity of skills and their complementarity with native skills that immigrants bring (Aleksynska & Tritah, 2015; Bove & Elia, 2017).

Research on immigrant-GDP relationships also raises concerns about endogeneity/simultaneity. Positive economic shocks in the destination country can be strong pull factors for immigration (Bove & Elia, 2017). Morley (2006) finds long-run causality from per capita GDP growth to immigration, but does not find any reverse causality (Morley, B., 2006). Islam and Khan (2015) note a bi-directional causality between real GDP and immigration in the long run; however, they argue that in the US, the causality runs only from economic growth to immigration (Islam & Khan, 2015).

A few studies have examined regional differences within a country to identify the nature and direction of the relationship between immigration and economic growth, and have found a positive relationship. However, these studies are limited in estimating the impact of working-age immigrants only (Peri, G., 2009), the impact of immigrants on state-level total GDP, which includes both private and public-sector output (Peri, G., 2009; Treyz & Evangelakis, 2018), the impact of immigrants on innovation and income growth (Burchardi et al., 2021), and the wage and employment impact of immigrants (Lewis & Peri, 2014). There are also very few studies on the impact of immigration on private-sector output. For example, Edwards and Ortega (2016) found a positive relationship between both legalized and unauthorized workers and private-sector GDP (Edwards & Ortega, 2016). However, this study views immigrants solely as a labor-market component and ignores the impact that immigrants outside the labor force may have on the economy.

In general, the evidence on the relationship between immigration and economic growth is unclear, which necessitates further investigation to contribute to the debate. Moreover, state economies operate under different tax regimes, labor market regulations, levels of economic freedom, educational systems, and industry compositions, all of which mediate the relationship between immigration and economic growth. Previous studies rarely consider these regional differences within a country because their geographical scope is, most of the time, global, a group of countries, or a national aggregate. Studies that examine U.S. state-level differences in the immigrant-GDP relationship either consider only working-age immigrants or focus on total GDP rather than private-sector output. Examining the relationship between total immigrants and private-sector GDP is important because the private sector comprises the portion of the economy driven by market mechanisms, entrepreneurial innovation, and competitive dynamics. Unlike total GDP, which includes government spending and public-sector activity, private-sector GDP more directly reflects the productive capacity generated by market participants, including immigrant-owned and immigrant-employing enterprises.

This study addresses these gaps by examining the impacts of immigrants on state-level private-sector GDP using an OLS approach and a flexible-form model that allows the effects of immigration to vary with state characteristics. Using a translog functional form and a simulation based on the estimation results, this study examines how the share of immigrants in a state's population affects the real private-sector GDPs across U.S. states from 2008 to 2023.

3 Methodology and Data

3.1 Empirical Framework

We model the impact of immigration on state-level private-sector GDP using a production-function approach. Our generalized function for explaining the real value of goods and services produced at the state level is:

$$Q = Q(IMM, DOM, EF, \%GRAD, IND, Time) \quad (1)$$

where Q represents real private-sector GDP, *IMM* is the number of immigrants, *DOM* is the number of native-born citizens, *EF* is the Fraser Institute's Economic Freedom of North America index, *%GRAD* is the percentage of the population between 25 and 65 years old with a college degree, *IND* is a vector of GDP share by industry, and *Time* is a time trend variable.

This specification is unique in its input measures, aiming to account for different contributions of immigrants and natives, the institutional environment, the skill levels of existing workers in the state, and industry composition.

Labor is separated into immigrants and native citizens in order to isolate the contributions of each to state GDP. While a strict production function model would only consider workers, we include the entire immigrant and native populations to account for the effects that nonworking populations have on the demand for goods and services.

A classic production model would also include private and public capital as explanatory variables. However, measures of capital are not available at the state level. Instead, we utilize the Fraser Institute's Economic Freedom of North America index as a measure of the institutional environment. This measure of economic freedom is likely an underlying factor influencing both the level of physical capital and labor productivity. Nevertheless, because the model does not explicitly account for the amount of private and public capital, it is likely that changes in the numbers of immigrants and native citizens measure the combined effects of changes in population and the accompanying capital. That is, as more citizens immigrate to a particular state, they bring and attract their own capital through entrepreneurship, creating profitable opportunities for other businesses to invest capital.

We include the percentage of the state's population aged 25 to 65 with a college degree to account for the existing level of human capital and its impact on labor productivity. Previous research (Amato et al., 2022) has shown a positive impact on state GDP associated with a higher percentage of the population holding a college degree.

Percentages of GDP accounted for by different industries are included to reflect differences in productivity across industries. We excluded one sector, trade, transportation, utilities, leisure, hospitality, and other services to avoid perfect collinearity in the model. Also, a time trend is included to account for technical change over time.

To estimate the generalized production function above, we use the translog functional form (Christensen et al., 1973). The translog is a second-degree polynomial of logs of the variables. Friedlaender and Spady (1980) show that the translog function can be thought of as a second-order Taylor series expansion of an arbitrary function. It can be written as follows:

$$\begin{aligned}
\ln Q = \beta_0 + \beta_1 \ln IMM + \beta_2 \ln DOM + \beta_3 \ln EF + \beta_4 \ln \%GRAD + \sum\nolimits_i \alpha_i \ln IND_i \qquad (2) \\
+ \gamma_5 Time + \frac{1}{2} \beta_{11} \ln IMM^2 + \beta_{12} \ln IMM \cdot \ln DOM \\
+ \beta_{13} \ln IMM \cdot \ln EF + \beta_{14} \ln IMM \cdot \ln \%GRAD \\
+ \sum\nolimits_{1i} \theta_{1i} \ln IMM \cdot \ln IND_i + \beta_{15} \ln IMM \cdot Time \\
+ \frac{1}{2} \beta_{22} \ln DOM^2 + \beta_{23} \ln DOM \cdot \ln EF + \beta_{24} \ln DOM \\
\cdot \ln \%GRAD + \sum\nolimits_{2i} \theta_{2i} \ln DOM \cdot \ln IND_i + \beta_{25} \ln DOM \cdot Time \\
+ \frac{1}{2} \beta_{33} \ln EF^2 + \beta_{34} \ln EF \cdot \ln \%GRAD + \sum\nolimits_{3i} \theta_{3i} \ln EF \ln IND_i \\
+ \beta_{35} \ln EF \cdot Time + \frac{1}{2} \beta_{44} \ln \%GRAD^2 + \sum\nolimits_{4i} \theta_{4i} \ln \%GRAD \\
\cdot \ln IND_i + \beta_{45} \ln \%GRAD \cdot Time + \frac{1}{2} \sum\nolimits_{ij} \theta_{ij} \ln IND_i \cdot \ln IND_j \\
+ \frac{1}{2} \beta_{55} Time^2 + \sum\nolimits_n \varphi_n \, state_n + \varepsilon
\end{aligned}$$

where $state_n$ is a dummy variable for state n, and ε is a disturbance term. All variables (excluding time trend and state dummies) are divided by their sample means, which serve as the base point for approximation. Additionally, we assume symmetry of relevant cross-term parameters:

$$\beta_{ab} = \beta_{ba}\ \forall ab, \theta_{ai} = \theta_{ia} \forall ai, \theta_{ij} = \theta_{ji} \forall ij \tag{3}$$

The above equation is estimated using an OLS regression model (Green, 2020). Table 1 presents summary statistics for the variables.

__Table 1.__ Descriptive Statistics

Variables	Mean	Std. dev.	Min.	Max.
Real Private Sector GDP (in millions)	331,183	421,127	24,949	2,910,459
Immigrant	854,055	1,714,258	12,952	10,696,945
Domestic	5,556,164	5,549,860	533,091	29,188,257
Economic Freedom Score	6.0925	0.9665	3.6317	8.3515
Construction and Manufacturing Sector	0.1768	0.0536	0.0693	0.3638
Education, Healthcare, and Service Sector	0.1044	0.0212	0.0468	0.1626
Information, Financial Activities, and Professional and Business Services Sector	0.4035	0.0823	0.1943	0.6696
Agriculture, Natural Resources, and Mining Sector	0.0435	0.0574	0.0015	0.3349
Percentage of Population with a Bachelor's Degree or Higher	0.3198	0.0602	0.1852	0.5103

Note: *N* = 800 for all variables. All descriptive statistics are by year and state. GDP is measured in millions of dollars.

3.2 Data

All data used in the study are state-level (50 U.S. states, excluding D.C.), annual, and cover the period from 2008 to 2023. We obtain data for these variables from widely used public sources. Foreign-born population shares and educational attainment rates were calculated from the American Community Survey (ACS) 1-year Public Use Microdata Sample (PUMS) files for 2008 through 2023 (n.d.). Foreign born population shares were multiplied by the census intercensal and annual population figures and rounded to integer format. The remaining population represents the domestic population. Census population estimates were taken from two intercensal estimates (2011, 2021) and one annual estimate (2024). We obtain historical GDP by industry from the Bureau of Economic Analysis (BEA, 2025). All GDP values are converted to real GDP using Gross Domestic Product: Chain-type Price Index from BEA, with 2017 as the base year (index = 100 for 2017). Industry shares as a percentage of GDP are defined and calculated using the Bureau of

Labor Statistics (BLS, 2026) “Industries by Supersector and NAICS Code,” and real private-sector GDP is calculated by subtracting the public administration (Govt) GDP share from total real GDP (Edwards & Ortega, 2016) . S. Economic freedom scores are obtained from the Fraser Institute’s EFNA index. We use state fixed effects to account for state-level variation.

4 Results and Discussion

4.1 Results from the OLS Regression Model

An important feature of the translog approximation applied in this study is that, because all variables except time are natural logarithms of the variables divided by their means, all first-order terms can be interpreted as elasticities when all variables except time are at their mean levels. Appendix Table A2 shows the results of our estimation.[1] As the table shows, all first-order terms except Graduate have their expected signs, and some are significant at p-values below 0.10. The main variables of interest, *IMM* and *DOM*, both show a significant positive impact on GDP. The combined elasticity shows that a 1% increase in population (immigrant or domestic) leads to about a 1.38% increase in state private-sector GDP.

While the elasticity of 1.38 suggests increasing returns to population for the average state, it should be noted that the population numbers proxy population and the accompanying capital, as mentioned previously. Because we don’t account for the amount of private or public capital, changes in population likely reflect changes in accompanying capital, as a higher population brings in new capital and creates more opportunities for businesses to invest.

It should also be noted that the magnitude of the effect of immigrants is much smaller than the effect of native citizens. However, this is because native citizens account for a much larger

[1] We account for heteroskedasticity and autocorrelation; we estimate a heteroskedasticity and autocorrelation-consistent covariance estimator.

share of the state's population than immigrants; that is, a 1% increase in native citizens represents a much larger increase in total population than a 1% increase in immigrants.

The quadratic term for native population shares is insignificant, implying no strong nonlinear effects on state-level real private-sector outputs. However, the positive and significant quadratic term for immigrants indicates a convex relationship between immigrant population and GDP, that is, the higher the immigrant population, the stronger its association with state private-sector output. The interaction between immigrant and native shares is negative and significant. But, because the variables are in log form, this does not tell us whether the immigrant and domestic populations are complements or substitutes. To identify that, we need to know how the marginal product of one changes with more of the other. In translog, this is determined as follows:

$$\frac{\partial^2 GDP}{\partial IMM \partial DOM} = (\beta_{12} + \beta_1 x \beta_2) x \frac{GDP}{IMM x DOM} \tag{4}$$

$$= (-0.09601 + (1.2269 x 0.15454) x \left(\frac{331{,}183\ mill}{854{,}055 x 5{,}556{,}164}\right)$$

$$= 0.0065$$

The positive signs indicates that immigrant and native populations are complements.

We find a positive and significant interaction between the domestic population and time, indicating that native-born population’s contribution to private sector GDP has increased over the sample period (2008-2023). This temporal pattern indicates improved labor market integration, skill upgrading, or increased participation in higher-productivity sectors over our study period.

Institutional quality, measured by the economic freedom index, exhibits a significant positive first-order effect on GDP within states, indicating higher private-sector GDP growth in the states with higher economic freedom. However, its interaction with time is negative and statistically significant. While this could imply that the growth advantage associated with economic freedom has declined over the sample period, one should be cautious about that interpretation, since economic freedom influences many other variables in the equation, including the migration of domestic and immigrant populations. We find a positive interaction effect between economic freedom and the immigrant population on state private-sector GDP, indicating that the impact of the immigrant population on state private-sector GDP growth is stronger in states with greater economic freedom. The negative interaction effect between economic freedom and domestic population suggests that the impact of domestic population on state private-sector GDP growth is lower in states with greater economic freedom. The quadratic term for economic freedom is insignificant, indicating no strong nonlinearities. Additionally, we find a negative coefficient for bachelor's attainment. However, this negative coefficient may reflect a correlation between educational attainment and structural changes in state economies that the model does not fully capture, rather than a causal negative effect of education on economic output. Moreover, a positive coefficient on the time interaction variable with bachelor’s attainment indicates the negative influence dissipates over time.

Other interesting parameter estimates include industry GDP shares. A 1% increase in the share of GDP in the education, healthcare, and social assistance sector, and in the natural resources and mining sector, lowers state private-sector GDP by 0.72% and 0.06%, respectively, compared to the trade, transportation, utilities, leisure, hospitality, and other services sector (the excluded sector in the model).

Finally, we find a positive impact of the time trend on private-sector GDP, indicating a systematic growth over the study period, even after controlling for population composition, economic freedom, human capital, and industry structures. The second-order (quadratic) time trend is positive and significant, indicating nonlinear growth dynamics in private-sector GDPs over the sample period, with growth accelerating in later years. This pattern is consistent with technological progress and structural adjustment that intensify over time rather than appearing at a single point in time.

4.2 Simulation (What-if) Analysis

Interpreting the impact of immigrants on GDP from the empirical model alone can be misleading. Since the native-born population constitutes the majority of the state's total population, the impact of domestic (native-born) people on GDP appears to be about 8 times higher than that of immigrants. Therefore, we conduct a simulation of the impact on GDP (what-if analysis) under two scenarios: changing the population by 1% while assuming all are domestic, and changing the population by 1% while assuming all are immigrants.

Findings from the simulation analyses are presented in Figures 1 to 3, with Figure 1 showing the percent change in the immigrant population required to achieve a 1% increase in the total population. Figures 2 and 3 exhibit the percentage change in state-level real private-sector GDP resulting from a 1% change in population, assuming all individuals are immigrants and native-born, respectively. (Appendix Tables A3 and A4 show these results in tabular form).

The simulations show that in states with smaller immigrant populations, the impact of adding more immigrants on real private-sector GDP is greater than in states with immigrant-heavy populations (e.g., New York, Texas, Florida, California), indicating diminishing returns (Figure 2). This is not surprising, as the benefits of immigrants' unique skills, which are complementary to existing populations, diminish as more of those skills already exist. For policymakers, this finding indicates that the economic effects of immigration are not uniform across states. In states with smaller immigrant populations, marginal increases in the immigration may be associated with larger output effects, suggesting that local (state-level) economic structures matter when evaluating immigration-related growth impacts.

They also show that states with more economic freedom, such as New Hampshire, South Dakota, Idaho, South Carolina, and Tennessee have larger impacts from immigration than states with low economic freedom. This highlights the potential importance of economic freedom in enhancing the benefits of immigration.

Figure 1. *Percentage Change in Immigrant Population Needed for 1% Increase in Total Population*

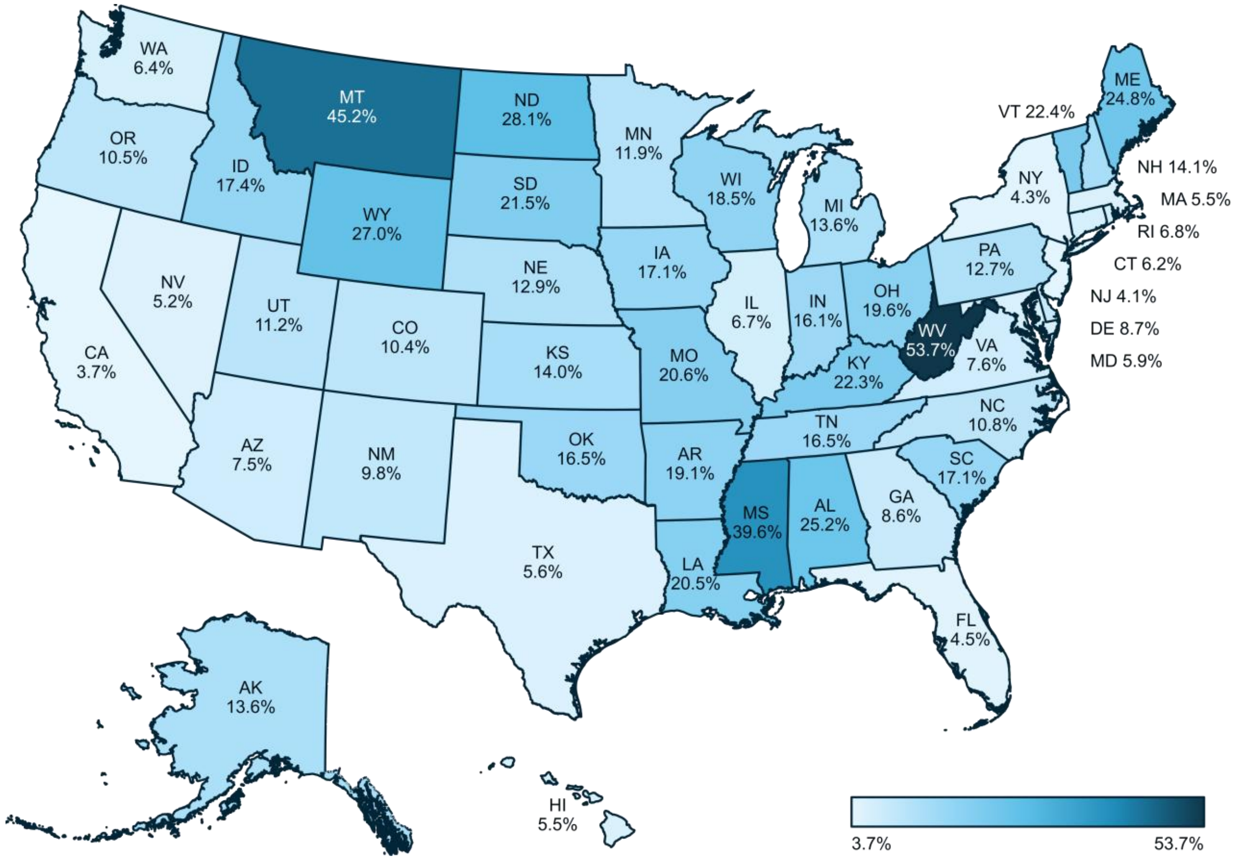


Figure 2. *Percentage Change in State Real Private-Sector GDP from a 1% Population Increase (All Immigrants)*

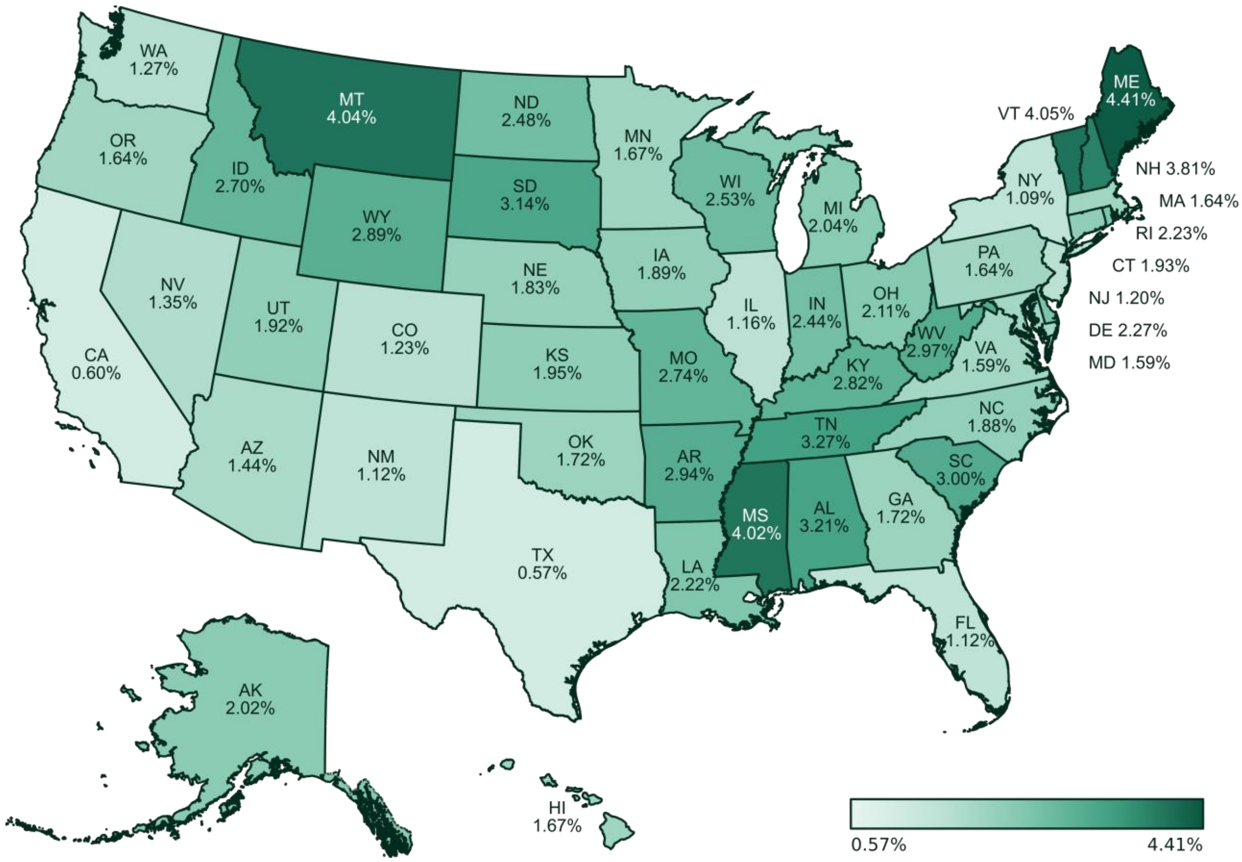
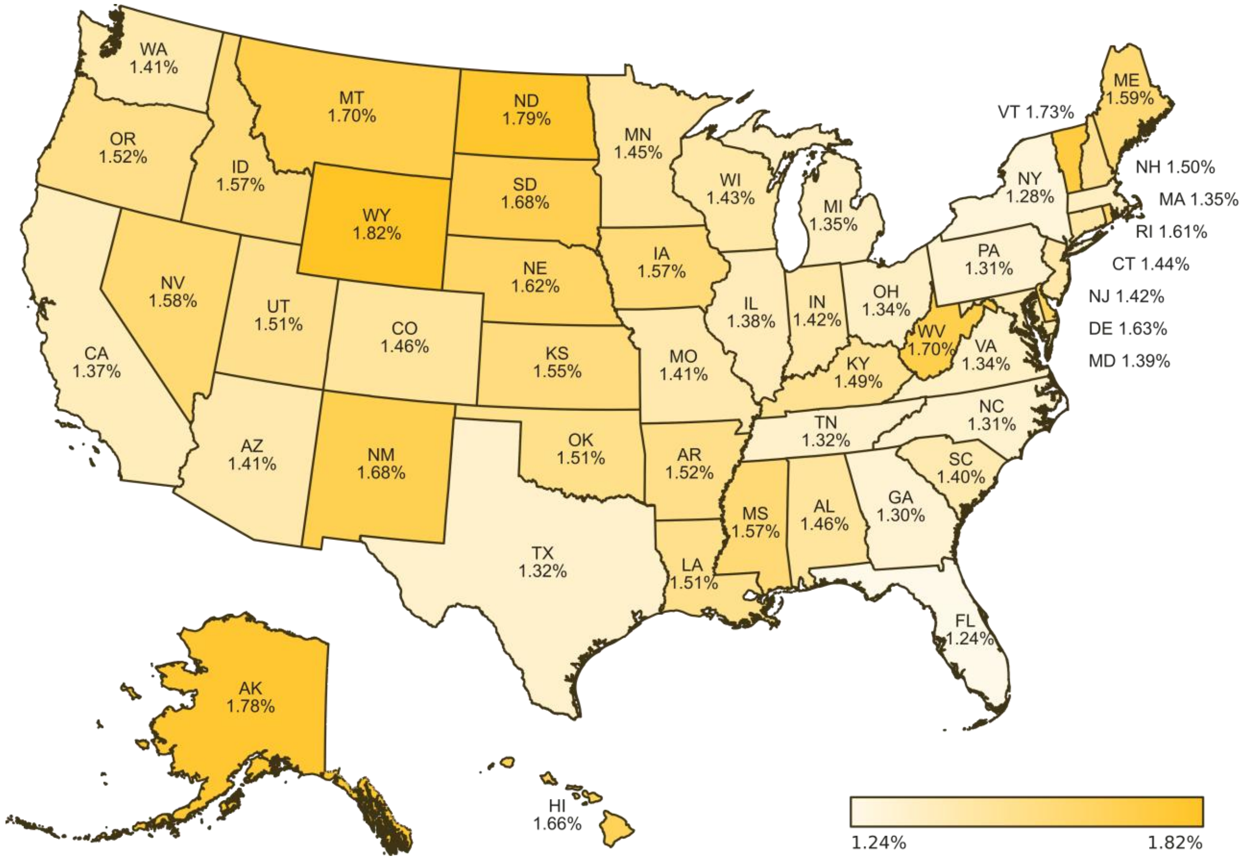


Figure 3. *Percentage Change in State Real Private-Sector GDP from a 1% Population Increase (All Native-Born)*



5 Conclusion

This paper addresses three critical gaps in the prior literature on the immigration-growth relationship. First, it identifies heterogeneous effects of immigration across states. We examine the impact of the immigrant population on private-sector GDP across all 50 U.S. states from 2008 to 2023. Second, by focusing on private-sector GDP rather than aggregate GDP, this study targets market-driven output where the mechanisms for economic growth, such as productivity, skills, and technological change, are most likely to operate. This study recognizes the possible simultaneity between population composition and state-level GDP, which could be addressed by estimating a two-stage least squares model with exogenous instruments[2]. However, the absence of state-level data makes it difficult to construct and incorporate reliable exogenous instruments into the model.

The empirical results indicate a 0.15% increase in state private-sector GDP resulting from a 1% increase in immigrants, and a 1.23% increase in state private-sector GDP resulting from a 1% increase in native-born residents, at the point of means and the time trend in 2023. The larger impact of a 1% increase in the native-born population is not surprising, since the native-born population makes up a much larger proportion of the population than the immigrant population.

This study complements regression estimates with two simulations (what-if) analyses for 2023, including two different 1% population changes: all immigrants versus all native-born. The simulation indicates that increased immigrants tend to have smaller effects on GDP in immigrant-heavy states (e.g., New York, Texas, Florida, California) than in states with smaller immigrant populations (e.g., Midwestern states), consistent with diminishing marginal effects at higher immigrant shares. It also shows that those with more economic freedom benefit more from immigration.

These findings present important empirical evidence countering narratives that claim economic harm from immigration. Because the study quantifies the impact of all immigrants on state private-sector GDP without distinguishing between those in the labor force and those outside it, the results contradict claims that immigrants use state-funded public services without making substantial economic contributions. Moreover, the positive impact on GDP for the entire population shows the positive effect immigrants have on native-born workers.

These findings have important implications for policymakers and researchers. For policymakers, our findings suggest that the positive economic impacts of immigration are substantial. Further, immigration-related output effects are unlikely to be well summarized by a single national estimate, as simulation analyses show substantial dispersion in private-sector GDP growth across states due to changes in the immigrant population. For researchers, the study shows that flexible production-function forms can reveal nonlinearities and cross-term relationships that linear specifications may overlook.

A number of promising avenues for future research exist. While good instruments for immigration are difficult to find at the state level, future research could explore potential data sources to account for potential endogeneity. [3] This study could be extended by incorporating innovation channels, using state-level measures such as patenting, R&D activity, and entrepreneurship, thereby allowing researchers to examine whether immigrants influence private-sector GDP through innovation and technological mechanisms. Second, heterogeneity analysis by immigrants' skill/education levels, tenure in the United States, and sector of employment could help distinguish the contributions of different immigrant groups to economic growth. Third, extending the framework to model spatial spillovers would help assess whether the effects of immigration on economic growth/GDP are overlapping across neighboring labor markets.

[3] To address endogeneity, we estimated a 2SLS regression model where the immigrant and domestic populations were predicted in the first-stage regression (using a sanctuary state dummy, regional price parity, and high school enrollment for instruments), and the predicted values (rather than the original populations) were used as regressors in the second-stage GDP regression. However, the effects of the domestic and immigrant populations in the 2SLS regression were larger (0.25% for the immigrant population and 2.07% for the domestic population) than those we found in the OLS regression. Because of the large magnitude of the results and the lack of good instruments, we chose to report OLS results. They yield a more conservative and realistic estimate of the impacts of immigration.

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Appendix

Table A1. Variables: Description and Data Sources

Variable Name	Description	Data Source
GDP	Natural log of state-level annual private sector GDP, adjusted for inflation. Private-sector GDPs are obtained by filtering out the public administration supersector from total GDP.	GDP historical data with industry classification from the Bureau of Economic Analysis (BEA).
Immigrant	Natural log of the mean-centered share of the population that is immigrant.	American Community Service Microdata-PUMS;
Domestic	Natural log of the mean-centered share of the population that is U.S-born.	American Community Service Microdata-PUMS;
Economic Freedom	Natural log of mean-centered value of the U.S. state-level annual economic freedom score.	2024 edition of the Fraser Institute's Economic Freedom of North America (EFNA) index at the subnational level.
Time	Time trend where the starting year (2008) is assigned the value 0 and increases by 1 each year up to 15 (2023).	
Graduate	Natural log of the mean-centered percentage of the population, age 25 through 65, that holds a bachelor's degree or above.	American Community Service Public Use Microdata; filtered for people who hold a bachelor's degree or above.
Covid	Binary indicator equal to 1 in 2020–2021.	
Construction and Manufacturing	Natural log of the mean-centered value of the construction and manufacturing sectors' share in state GDP in a given year.	State-level GDP historical data from the Bureau of Economic Analysis (BEA), filtered for the construction and manufacturing sectors' share of the GDP.
Education and Healthcare	Natural log of the mean-centered value of the education, healthcare, and service sectors' share in state GDP in a given year.	State-level GDP historical data from the Bureau of Economic Analysis (BEA), filtered for the education, healthcare, and service sectors' share of the GDP.

Table A1. (Continued)

Variable Name	Description	Data Source
Information, Finance, Professional/Business	Natural log of the mean-centered value of the Information, Financial Activities, and Professional and Business Services sectors' share in state GDP in a given year.	State-level GDP historical data from the Bureau of Economic Analysis (BEA), filtered for the information, financial activities, and professional and business services sectors' share of the GDP.
Natural Resources and Mining	Natural log of mean-centered value of agriculture, and natural resources and mining sectors' share in state GDPs in a given year.	State-level GDP historical data from the Bureau of Economic Analysis (BEA), filtered for the agriculture, natural resources, and mining share of the GDP.
Immigrant X Domestic	Interaction between predicted domestic population share and predicted immigrant population share.	
Immigrant X Economic Freedom	Interaction between predicted immigrant population share and economic freedom.	
Immigrant X Time	Interaction between predicted immigrant population share and time trend.	
Immigrant X Graduate	Interaction between predicted immigrant population share and educational attainment.	
Immigrant X Construction/ Manufacturing	Interaction between predicted immigrant population share and construction/manufacturing share.	
Immigrant X Education and Healthcare	Interaction between predicted immigrant population share and education/health/services share.	
Immigrant X Information, Finance, Professional/Business	Interaction between predicted immigrant population share and information/finance/professional services share.	

Table A1. (Continued)

Variable Name	Description	Data Source
Immigrant X Natural Resources and Mining	Interaction between predicted immigrant population share and natural resources/mining share.	
Domestic X Economic Freedom	Interaction between predicted domestic population share and economic freedom.	
Domestic X Time	Interaction between predicted domestic population share and time trend.	
Domestic X Graduate	Interaction between predicted domestic population share and educational attainment.	
Domestic X Construction and Manufacturing	Interaction between predicted domestic population share and construction/manufacturing share.	
Domestic X Education and Healthcare	Interaction between predicted domestic population share and education/health/services share.	
Domestic X Information, Finance, Professional/Business	Interaction between predicted domestic population share and information/finance/professional services share.	
Domestic X Natural Resources and Mining	Interaction between predicted domestic population share and natural resources/mining share.	
Economic Freedom X Time	Interaction between economic freedom and time trend.	
Economic Freedom X Graduate	Interaction between economic freedom and educational attainment.	
Economic Freedom X Construction and Manufacturing	Interaction between economic freedom and construction/manufacturing share.	
Economic Freedom X Education and Healthcare	Interaction between economic freedom and education/health/services share.	
Economic Freedom X Information, Finance, Professional/Business	Interaction between economic freedom and information/finance/professional services share.	
Economic Freedom X Natural Resources and Mining	Interaction between economic freedom and natural resources/mining share.	

Table A1. (Continued)

Variable Name	Description	Data Source
Time X Graduate	Interaction between time trend and educational attainment.	
Time X Construction and Manufacturing	Interaction between time trend and construction/manufacturing share.	
Time X Education and Healthcare	Interaction between time trend and education/health/services share.	
Time X Information, Finance, Professional/Business	Interaction between time trend and information/finance/professional services share.	
Time X Natural Resources and Mining	Interaction between time trend and natural resources/mining share.	
Graduate X Construction and Manufacturing	Interaction between educational attainment and construction/manufacturing share.	
Graduate X Education and Healthcare	Interaction between educational attainment and education/health/services share.	
Graduate X Information, Finance, Professional/Business	Interaction between educational attainment and information/finance/professional services share.	
Graduate X Natural Resources and Mining	Interaction between educational attainment and natural resources/mining share.	
Construction and Manufacturing X Education and Healthcare	Interaction between construction/manufacturing and education/health/services sectors.	
Construction and Manufacturing X Information, Finance, Professional/Business	Interaction between construction/manufacturing and information/finance/professional services sectors.	
Construction and Manufacturing X Natural Resources and Mining	Interaction between construction/manufacturing and natural resources/mining sectors.	

Table A1. (Continued)

Variable Name	Description	Data Source
Education and Healthcare X Information, Finance, Professional/Business	Interaction between education/health/services and information/finance/professional services sectors.	---
Education and Healthcare X Natural Resources and Mining	Interaction between education/health/services and natural resources/mining sectors.	---
Information, Finance, Professional/Business X Natural Resources and Mining	Interaction between information/finance/professional services and natural resources/mining sectors.	---
$Immigrant^2$	Square of Immigrant divided by 2.	---
$Domestic^2$	Square of Domestic divided by 2.	---
Economic $Freedom^2$	Square of Economic Freedom divided by 2.	---
$Time^2$	Square of Time divided by 2.	
$Graduate^2$	Square of Graduae divided by 2.	
Construction and $Manufacturing^2$	Square of Construction and Manufacturing divided by 2.	
Education and $Healthcare^2$	Square of Education and Healthcare divided by 2.	---
Information, Finance, $Professional/Business^2$	Square of Information, Finance, Professional/Business divided by 2.	---
Natural Resources and $Mining^2$	Square of Natural Resources and Mining divided by 2.	---

Table A2. Estimation of Determinants of Private Sector GDP: Heteroskedasticity and Autocorrelation Consistent Covariance Matrix

Variable	Estimate	Standard Error	t Value	Pr > |t|
Intercept	13.5746	0.2070	65.57***	<.0001
Immigrant	0.1545***	0.0544	2.84	0.0046
Domestic	1.2269***	0.3853	14.13	<.0001
Economic Freedom (EF)	0.0886*	0.0503	1.76	0.0788
Time	0.0133***	0.0020	6.55	<.0001
Graduate	-0.3259***	0.0953	-3.42	0.0007
Cons. & Manufacturing	0.0534	0.0630	0.85	0.3972
Education & Healthcare	-0.7167***	0.0632	-11.34	<.0001
Info, Finance, and Prof/Bus	0.0081	0.1085	0.07	0.9405
Natural Resources & Mining	-0.06406***	0.0250	-2.57	0.0105
Immigrant X Domestic	-0.09601**	0.0430	-2.23	0.0260
Immigrant X EF	0.067229*	0.0378	1.78	0.0760
Immigrant X Time	0.000731	0.00122	0.60	0.5485
Immigrant X Graduate	-0.07563	0.0557	-1.36	0.1749
Immigrant X Cons/Manuf	-0.01492	0.0448	-0.33	0.7395
Immigrant X Educ/Health	0.022177	0.0516	0.43	0.6677
Immigrant X Info/Fin/Prof/Bus	-0.02163	0.0723	-0.30	0.7648
Immigrant X Natural Resources & Mining	-0.04229***	0.0162	-2.61	0.0092
Domestic X EF	-0.11706*	0.0614	-1.91	0.0571
Domestic X Time	0.003926*	0.00203	1.94	0.0529
Domestic X Graduate	0.083235	0.0916	0.91	0.3636
Domestic X Cons/Manuf	0.0507	0.0666	0.76	0.4467
Domestic X Educ/Health	-0.02789	0.0807	-0.35	0.7295
Domestic X Info/Fin/Prof/Bus	-0.0369	0.1096	-0.34	0.7364
Domestic X Natural Resources & Mining	0.03981*	0.0205	1.95	0.0521
EF X Time	-0.00757*	0.00396	-1.91	0.0566
EF X Graduate	-0.06566	0.1412	-0.46	0.6422
EF X Cons/Manuf	0.18562*	0.0998	1.86	0.0632

Note: *, **, *** represent significance level at 10%, 5%, and 1% respectively

Table A2. (Continued)

Variable	Estimate	Standard Error	t Value	Pr > |t|
EF X Educ/Health	-0.02238	0.1247	-0.18	0.8577
EF X Info/Fin/Prof/Bus	0.346527	0.346527	0.346527	0.346527
EF X Natural Resources & Mining	0.008895	0.0277	0.32	0.7480
Time X Graduate	0.014575***	0.00533	2.73	0.0064
Time X Cons/Manuf	-0.00395	0.00360	-1.10	0.2728
Time X Educ/Health	0.007881**	0.00354	2.22	0.0265
Time X Info/Fin/Prof/Bus	-0.01223*	0.00653	-1.87	0.0615
Time X Natural Resources & Mining	0.001473*	0.000893	1.65	0.0995
Graduate X Cons/Manuf	-0.04886	0.1429	-0.34	0.7325
Graduate X Educ/Health	-0.42424***	0.1566	-2.71	0.0069
Graduate X Info/Fin/Prof/Bus	0.134725	0.2298	0.59	0.5580
Graduate X Natural Resources & Mining	0.014299	0.0372	0.38	0.7007
Cons/Manuf X Educ/Health	0.047943	0.1088	0.44	0.6595
Cons/Manuf X Info/Fin/Prof/Bus	-0.05696	0.1844	-0.31	0.7575
Cons/Manuf X Natural Resources & Mining	-0.01768	0.0326	-0.54	0.5881
Educ/Health X Info/Fin/Prof/Bus	-0.02697	0.1805	-0.15	0.8813
Educ/Health X Natural Resources & Mining	-0.0625*	0.0355	-1.76	0.0784
Info/Fin/Prof/Bus X Natural Resources & Mining	-0.00383	0.0619	-0.06	0.9507

Note: *, **, *** represent significance level at 10%, 5%, and 1% respectively

Table A2. *(Continued)*

Variable	Estimate	Standard Error	t Value	Pr > |t|
$Immigrant^2$	0.059275*	0.0338	1.75	0.0802
$Domestic^2$	-0.02086	0.0891	-0.23	0.8150
Economic $Freedom^2$	-0.05169	0.1781	-0.29	0.7717
$Time^2$	0.000686***	0.000174	3.94	<.0001
$Graduate^2$	-0.89131***	0.2954	-3.02	0.0026
Construction and $Manufacturing^2$	-0.0078	0.1079	-0.07	0.9424
Education and $Healthcare^2$	0.609327***	0.1694	3.60	0.0003
Information, Finance, $Professional/Business^2$	0.814296**	0.4125	1.97	0.0488
Natural Resources and $Mining^2$	-0.01937	0.0127	-1.53	0.1270

Note: *, **, *** represent significance level at 10%, 5%, and 1% respectively

Table A3. *Simulated Private-Sector GDP Effects of a Native-Born Population Increase Equivalent to 1% Total Population Growth (2023)*

State	Population	Native-Born Population Change Needed (%)	GDP Change (%)
Alabama	5,117,673	1.04%	1.46%
Alaska	736,510	1.08%	1.78%
Arizona	7,473,027	1.15%	1.41%
Arkansas	3,069,463	1.06%	1.52%
California	39,198,693	1.38%	1.37%
Colorado	5,901,339	1.11%	1.46%
Connecticut	3,643,023	1.19%	1.44%
Delaware	1,036,423	1.13%	1.63%
Florida	22,904,868	1.28%	1.24%
Georgia	11,064,432	1.13%	1.30%
Hawaii	1,441,387	1.22%	1.66%
Idaho	1,971,122	1.06%	1.57%
Illinois	12,642,259	1.18%	1.38%
Indiana	6,880,131	1.07%	1.42%
Iowa	3,218,414	1.06%	1.57%
Kansas	2,951,500	1.08%	1.55%
Kentucky	4,550,595	1.05%	1.49%
Louisiana	4,588,071	1.05%	1.51%
Maine	1,399,646	1.04%	1.59%
Maryland	6,217,062	1.21%	1.39%
Massachusetts	7,066,568	1.22%	1.35%
Michigan	10,083,356	1.08%	1.35%
Minnesota	5,753,048	1.09%	1.45%
Mississippi	2,943,172	1.03%	1.57%
Missouri	6,208,038	1.05%	1.41%
Montana	1,131,302	1.02%	1.70%
Nebraska	1,987,864	1.08%	1.62%

Table A3. Continued

State	Population	Native-Born Population Change Needed (%)	GDP Change (%)
Nevada	3,214,363	1.24%	1.58%
New Hampshire	1,402,199	1.08%	1.50%
New Jersey	9,379,642	1.32%	1.42%
New Mexico	2,121,164	1.11%	1.68%
New York	19,737,367	1.30%	1.28%
North Carolina	10,881,189	1.10%	1.31%
North Dakota	789,047	1.04%	1.79%
Ohio	11,824,034	1.05%	1.34%
Oklahoma	4,063,882	1.06%	1.51%
Oregon	4,253,653	1.11%	1.52%
Pennsylvania	13,017,721	1.09%	1.31%
Rhode Island	1,103,429	1.17%	1.61%
South Carolina	5,387,830	1.06%	1.40%
South Dakota	918,305	1.05%	1.68%
Tennessee	7,148,304	1.06%	1.32%
Texas	30,727,890	1.22%	1.32%
Utah	3,443,222	1.10%	1.51%
Vermont	648,708	1.05%	1.73%
Virginia	8,734,685	1.15%	1.34%
Washington	7,857,320	1.19%	1.41%
West Virginia	1,770,495	1.02%	1.70%
Wisconsin	5,930,405	1.06%	1.43%
Wyoming	585,067	1.04%	1.82%

Table A4. *Simulated Private-Sector GDP Effects of an Immigrant Population Increase Equivalent to 1% Total Population Growth (2023)*

State	Population	Immigrant Population Change Needed (%)	GDP Change (%)
Alabama	5,117,673	25.18%	3.21%
Alaska	736,510	13.55%	2.03%
Arizona	7,473,027	7.55%	1.44%
Arkansas	3,069,463	19.06%	2.94%
California	39,198,693	3.66%	0.60%
Colorado	5,901,339	10.44%	1.23%
Connecticut	3,643,023	6.16%	1.93%
Delaware	1,036,423	8.68%	2.27%
Florida	22,904,868	4.53%	1.12%
Georgia	11,064,432	8.63%	1.72%
Hawaii	1,441,387	5.55%	1.67%
Idaho	1,971,122	17.42%	2.70%
Illinois	12,642,259	6.67%	1.16%
Indiana	6,880,131	16.09%	2.44%
Iowa	3,218,414	17.13%	1.89%
Kansas	2,951,500	14.02%	1.95%
Kentucky	4,550,595	22.30%	2.82%
Louisiana	4,588,071	20.51%	2.22%
Maine	1,399,646	24.77%	4.41%
Maryland	6,217,062	5.87%	1.59%
Massachusetts	7,066,568	5.51%	1.64%
Michigan	10,083,356	13.56%	2.04%
Minnesota	5,753,048	11.90%	1.67%
Mississippi	2,943,172	39.57%	4.02%
Missouri	6,208,038	20.56%	2.74%
Montana	1,131,302	45.17%	4.04%
Nebraska	1,987,864	12.91%	1.83%

Table A4. Continued

State	Population	Immigrant Population Change Needed (%)	GDP Change (%)
Nevada	3,214,363	5.20%	1.35%
New Hampshire	1,402,199	14.11%	3.81%
New Jersey	9,379,642	4.14%	1.20%
New Mexico	2,121,164	9.84%	1.12%
New York	19,737,367	4.32%	1.09%
North Carolina	10,881,189	10.80%	1.88%
North Dakota	789,047	28.15%	2.48%
Ohio	11,824,034	19.61%	2.11%
Oklahoma	4,063,882	16.51%	1.72%
Oregon	4,253,653	10.47%	1.64%
Pennsylvania	13,017,721	12.69%	1.64%
Rhode Island	1,103,429	6.85%	2.23%
South Carolina	5,387,830	17.11%	3.00%
South Dakota	918,305	21.47%	3.14%
Tennessee	7,148,304	16.52%	3.27%
Texas	30,727,890	5.60%	0.57%
Utah	3,443,222	11.21%	1.92%
Vermont	648,708	22.43%	4.05%
Virginia	8,734,685	7.56%	1.59%
Washington	7,857,320	6.39%	1.27%
West Virginia	1,770,495	53.66%	2.97%
Wisconsin	5,930,405	18.47%	2.53%
Wyoming	585,067	27.04%	2.89%