The Effects of Immigration on Entrepreneurship and Innovation

Robert Krol

MERCATUS WORKING PAPER

MERCATUS CENTER
George Mason University
3434 Washington Blvd., 4th Floor, Arlington, Virginia 22201
www.mercatus.org

Robert Krol, "The Effects of Immigration on Entrepreneurship and Innovation." Working Paper, Mercatus Center at George Mason University, Arlington, VA, May 2021.

Abstract

This paper reviews evidence about the effects of immigration on entrepreneurship and innovation. The number of immigrants has increased both in absolute numbers and as a share of the US population. The countries of origin have shifted from Europe to Latin America and Asia. The share of higher-skilled immigrants has risen, while the share of lower-skilled immigrants has declined. Immigrants tend to be entrepreneurial and to start a significant share of US businesses. Those new firms make a significant contribution to employment growth in the United States. Research indicates that immigrants tend to be innovative. This finding is partially the result of a large percentage of immigrants with science, technology, engineering, and math (STEM) degrees. The share of US patents going to immigrants has significantly increased over time. Immigrant inventors are a complement to native inventors, thus raising total productivity over time.

JEL codes: J6, 03

Keywords: immigration, entrepreneurship, innovation

Author Affiliation and Contact Information

Robert Krol
Senior Affiliated Scholar
Mercatus Center
George Mason University
Arlington, VA 22201

Professor Emeritus of Economics
California State University, Northridge
Northridge, CA 91330-8374

This paper can be accessed at https://www.mercatus.org/publications/immigration/what-do-we-know-about-impact-im.

The Effects of Immigration on Entrepreneurship and Innovation

Robert Krol

Economic growth in advanced economies is driven primarily by innovations that improve productivity.[1] Entrepreneurs and researchers, who are motivated by economic incentives, generate new ideas that result in either new or expanded businesses. The resulting expansion of businesses generates new and better products and services. Entrepreneurs also change the way production is organized because they improve efficiency that lowers prices for consumers. Such actions produce economic growth, which manifests itself by increasing product variety, jobs, and wages. As a result, economic well-being increases.[2]

Immigrant entrepreneurs play a role in the economic growth process. Higher levels of immigration were found to increase economic growth through an immigrant's productive skills and innovation-related activities.[3] Immigrants are also capturing a larger percentage

---

[1] Paul M. Romer, "Endogenous Technological Change," *Journal of Political Economy* 98, no. 2 (1990): S71–S102; Charles I. Jones, "R & D–Based Models of Economic Growth," *Journal of Political Economy* 103, no. 4 (1995): 759–84; Ufuk Akcigit and William Kerr, "Growth through Heterogeneous Innovations," *Journal of Political Economy* 126, no. 4 (2018): 1374–443. Advanced economies have high levels of physical and human capital, which results in higher standards of living, and those economies can also promote economic growth. Being mostly market-oriented economies, they tend to operate at a relatively high level of efficiency. Charles I. Jones, "The Facts of Economic Growth," in *Handbook of Macroeconomics,* ed. John Taylor and Michael Woodford (Amsterdam: Elsevier B.V., 2016).

[2] Deirdre N. McCloskey, *Bourgeois Equality: How Ideas, Not Capital or Institutions, Enriched the World* (Chicago: University of Chicago Press, 2016) also stresses the important role that ideas play in economic prosperity from an economic history perspective.

[3] Francesc Ortega and Giovanni Peri, "Openness and Income: The Roles of Trade and Immigration," *Journal of International Economics* 92, no. 2 (2014): 231–51.

of patents in the United States.[4] In addition, immigrants contribute to new businesses, and they tend to be more entrepreneurial than the average US citizen.[5]

Immigration is controversial because people have differing views about the effects that immigrants have on the economy and culture.[6] Some US citizens are concerned that the increase in immigration may change the country's national identity. Others view immigrants as being similar to themselves. Immigrants are people trying to improve their life and economic circumstances. Political rhetoric intensifies such differences, thereby making immigration reform less likely.

A look at polling data provides a sense of the divergent views that individuals have on immigration. Polling data in the United States suggest that people are generally divided over the effects of immigrants on the country.

A 2020 CBS News poll asked, "Generally, do you think immigrants coming to the United States make American society better in the long run, make American society worse in the long run, or you don't think immigrants coming to the U.S. have much of an effect on American society one way or the other?" Among respondents, 55 percent said better, 16 percent said worse, and 20 percent said it did not have much effect.[7]

---

[4] William R. Kerr, *The Gift of Global Talent: How Migration Shapes Business, Economy & Society* (Stanford Business Books, Stanford, CA, 2019).

[5] Kerr, *The Gift of Global Talent*.

[6] This paper focuses on the economic rather than the cultural effects of immigration. Although it is unlikely that culture and the economy are unrelated, there is evidence that cultural diversity, when measured by the diversity of a country's immigrants, raises native wages and the rental value of homes. Gianmarco I. P. Ottaviano and Giovanni Peri, "The Economic Value of Cultural Diversity: Evidence from U.S. Cities," *Journal of Economic Geography* 6, no. 1 (2006): 9–44.

[7] CBS News poll taken from PollingReport.com, http://www.pollingreport.com.

A 2020 Gallup poll asked the question, "In your view, should immigration be kept at its present level, increased, or decreased?" Among respondents, 36 percent wanted to keep it at the present level, 34 percent thought it should increase, and 28 percent wanted it decreased. Whereas responses have fluctuated over time, the percentage of people who think the level of immigration should be increased equaled only 7 percent in the earliest poll taken in 1965. Respondents who thought it should be kept at the same level or decreased declined over the same period suggesting, at least until recently, that immigration appeared to be viewed more favorably.[8]

Those polls suggest that people in the United States are divided about the costs and benefits of immigration. US citizens should keep in mind that immigrants, especially high-skilled ones, start new businesses and play an important role in technological innovation—both of which help create jobs and raise wages for everyone. Immigrants help provide important services such as in health care.[9] The net benefits of immigration promote economic growth and well-being, thus expanding opportunities for both immigrants and native-born populations in the United States.

To better understand the effects of immigration on the economy, this paper will provide basic data about immigration trends in the United States. The main body of the paper will review the evidence from studies that examine the effects of immigration on entrepreneurship and innovation.

---

[8] Gallup, "Immigration," https://news.gallup.com/poll/1660/immigration.aspx.

[9] For a discussion of the role of immigrants in developing COVID vaccines, see Scott Lincicome, "The COVID Vaccines Are a Triumph of Globalization," commentary, December 8, 2020, Cato Institute, https://www.cato.org/publications/commentary/covid-vaccines-are-triumph-globalization.

Immigrants in the United States

Immigrants are people living in the United States who were not US citizens at birth.[10] Table 1 provides data about the total number of immigrants (measured in thousands). It also expresses the number as a percentage of US population between 1960 and 2019. Both measures have increased significantly over the period.

Table 1. Total Immigrants (in thousands)

	1960	1970	1980	1990	2000	2010	2019
Number of immigrants	9,738	9,619	14,080	19,767	31,108	39,956	39,463
Percentage of US population	5.4	4.7	6.2	7.9	11.1	12.9	13.7

Note: The number of immigrants is measured in thousands.
Source: Migration Policy Institute Data Hub, https://www.migrationpolicy.org/programs/data-hub/us-immigration-trends#history.

Table 2 provides a breakdown of immigration data by country of origin. For each country, if it was in the top 10 (by amount) for the years between 1960 and 2019, the table lists the percentage of total immigrants from that country in that year. For the years in which the country was not in the top 10, no data are reported. More than 10 countries are listed because over time, countries in the top 10 in early years drop out and new countries enter the top 10. Two trends are apparent. First, European countries make up a larger portion of source countries in the earlier years but not in later years. Second, the share of total immigrants from Asia, Central America, and South America has increased over time. Unsurprisingly, Mexico captures the largest share by far in 1980 and beyond.

[10] This definition includes naturalized US citizens, green-card holders, refugees, asylees, temporary-visa holders, and unauthorized persons.

Table 2. Country of Origin—Data Available for the Top 10 Each Column

Country	1960	1970	1980	1990	2000	2010	2019
Austria	3.1	2.2	—	—	—	—	—
Canada	9.8	8.4	6.0	3.8	2.6	—	—
China	—	—	—	2.7	3.2	4.0	5.3
Cuba	—	4.6	4.3	3.7	2.8	2.8	3.1
Dominican Republic	—	—	—	—	—	2.2	2.5
El Salvador	—	—	—	—	2.7	3.0	3.1
Germany	10.2	8.7	6.0	3.6	2.3	—	—
Guatemala	—	—	—	—	—	2.1	2.2
Hungary	2.5	—	—	—	—	—	—
India	—	—	—	—	3.3	4.5	6.1
Ireland	3.5	2.6	—	—	—	—	—
Italy	12.9	10.5	5.9	2.9	—	—	—
Republic of Korea	—	—	2.1	2.9	2.8	2.8	2.4
Mexico	5.9	7.9	15.6	21.7	29.5	29.3	25.0
Philippines	—	—	3.6	4.6	4.4	4.4	4.7
Poland	7.7	5.7	3.0	—	—	—	—
Soviet Union/Russia	7.1	4.8	2.9	—	—	—	—
United Kingdom	8.6	7.1	4.8	3.2	—	—	—
Vietnam	—	—	—	2.7	3.2	3.1	3.2
Other	28.8	37.5	45.9	48.1	43.3	41.8	42.4

Notes:
(a) Each number is a country's percentage of the immigrant population in the United States in a particular year. The countries are listed in alphabetical order. More than 10 countries are listed because, over time, some countries fall out and some are added to the top 10 in a particular year because of different immigrant flows.
(b) — = not applicable.
Source: Migration Policy Institute Data Hub, US Immigration Trends, |migrationpolicy.org.

Table 3 provides the educational attainment level for immigrants from 10 countries with the largest share of immigration in 2019. Panel A looks at all immigrants, whereas panel B looks at the same group of countries but for all the immigrants who came to the United States *after* 2013. The skill distribution of immigrants tends to have a U shape. Skill levels concentrate at the high and low ends of the distribution. We can see this concentration in table 3. I calculate that, for all immigrants between 1960 and 2019, 26.3 percent had fewer than 12 years of education, whereas 32.7 percent had a bachelor's degree or more (panel A). For comparison, in 2019, 36.3 percent of native-born US citizens had a

bachelor's degree or more, and 6.7 percent had not graduated from high school. Those percentages change for the more recent immigrants: 18.6 percent have fewer than 12 years of education whereas 47.9 percent have a bachelor's degree or more (panel b). The skill mix of immigrants as measured by education level has changed, with fewer unskilled workers and more skilled workers.

Table 3. Immigrant Educational Attainment 2019

Country	Less than 9th grade (%)	9th–12th grade (%)	High school diploma (%)	Some college or associate degree (%)	Bachelor's degree or higher (%)
Panel A					
China	12.5	7.5	16.5	12.3	51.2
Cuba	11.6	12.1	31.0	20.8	24.4
Dominican Republic	18.8	12.5	30.0	22.6	16.1
El Salvador	33.1	16.6	26.6	15.0	8.7
Guatemala	43.2	12.9	22.5	14.1	7.4
India	3.1	3.5	6.8	7.1	79.5
Korea	4.5	3.4	17.7	18.8	55.6
Mexico	34.6	18.0	26.0	13.6	7.8
Philippines	4.1	3.1	15.2	27.2	50.4
Vietnam	17.2	11.1	23.0	21.5	27.2
Native Born	1.5	5.2	28.7	28.2	36.3
Panel B					
China	8.3	4.7	15.1	10.7	61.2
Cuba	5.8	10.8	37.4	14.5	31.5
Dominican Republic	16.0	11.7	32.8	20.5	18.9
El Salvador	33.2	16.0	25.8	13.7	11.3
Guatemala	49.9	10.9	21.8	10.5	6.9
India	3.0	2.7	5.0	3.6	85.7
Korea	3.2	0.8	6.7	12.4	76.9
Mexico	27.7	17.8	25.2	10.6	18.7
Philippines	3.7	2.5	17.6	23.3	52.8
Vietnam	16.4	12.3	32.1	15.0	24.3

Note: The countries are listed in alphabetical order. Each entry measures the educational attainment as a percentage of that country's immigrants in the United States. Panel A is for all adults (ages 25 and older) residing in the United States. Panel B is for adults (ages 25 and older) who arrived in the United States in the past five years.
Sources: Migration Policy Institute Data Hub, US Immigration Trends migrationpolicy.org; native-born data from the US Census Bureau, https://www.census.gov/content/census/en/data/tables/2019/demo/educational-attainment/cps-detailed-tables.html.

More than 85 percent of recent immigrants from India have a bachelor's degree or more. Other countries that provide a large percentage of skilled labor include China and the Philippines. Moreover, Guatemala, Mexico, Vietnam, and the Dominican Republic provide the largest shares of unskilled labor.

The number of immigrants has increased both in absolute numbers and as a share of the US population. Moreover, the countries of origin have shifted from Europe to Latin America and Asia. The share of higher-skilled immigrants has risen, while the share of lower-skilled immigrants has declined.

Immigration and Entrepreneurship

Data indicate the growth in entrepreneurship in the United States is slowing. Decker et al. report that in recent decades the trend has been downward in the *growth* of business startups in the United States.[11] The decline has accelerated since 2000. One way to offset this growth trend is to expand immigration, especially among higher-skilled entrepreneurial immigrants.[12]

Decker et al. found that between 1980 and 2010 gross job creation averaged approximately 18 percent of the workforce, or about 2.9 million jobs annually. Net job

---

[11] Ryan Decker, John Haltiwanger, Ron Jarmin, and Javier Miranda, "The Role of Entrepreneurship in US Job Creation and Economic Dynamism," *Journal of Economic Perspectives* 28, no. 3 (2014): 3–24; Congressional Budget Office, *Federal Responses to Declining Entrepreneurship*, December 29, 2020.

[12] Sari Pekkala Kerr and William Kerr, "Immigrant Entrepreneurship in America: Evidence from the Survey of Business Owners, 2007 & 2012," *Research Policy* 49, no. 3 (2020): 1–18; Kerr, *The Gift of Global Talent*.

creation for startup firms was also 2.9 million per year.[13] They also found that startup size has not increased.

Fairlie, Miranda, and Zolas found that the average number of startups between 1995 and 2010 was 5.4 million per year.[14] This number represents about 25 percent of the total businesses in the United States. Such startups create about 3 million jobs in their startup year and employ 2.9 million workers five years later. This figure is comparable with those reported in Decker et al. The employment growth of the surviving firms more than offsets the job loses of firms that exit. In fact, without the additional jobs, aggregate employment growth in the United States would have been negative during this period.

Immigrants tend to be more entrepreneurial than does the average US citizen.[15] They apparently are more mobile and appear to be willing to take on more risk. The difference can be explained partly by the fact that an individual's decision to emigrate is risky, much like starting a new business. Immigrants, by their nature, appear to be more tolerant of risk.

Immigrants may also be more likely to start their own business because they initially may face discrimination in the labor market.[16] The growing percentage of immigrants with

---

[13] Decker et al., "The Role of Entrepreneurship." One reason is that a startup firm has not lost any jobs in the past, so gross and net job creation will be the same. Because the entire private sector's net job creation is 1.4 million per year, older firms must have experienced negative net job creation.

[14] Robert W. Fairlie, Javier Miranda, and Nikolas Zolas, "Job Creation and Survival among Entrepreneurs: Evidence from the Universe of U.S. Startups" (Working Paper, University of California, Santa Cruz, 2018); Robert W. Fairlie, Javier Miranda, and Nikolas Zolas, "Measuring Job Creation, Growth, and Survival among the Universe of Start-ups in the United States Using a Combined Start-up Panel Data Set," *Industrial and Labor Relations Review* 72, no. 5 (2019): 1262–77.

[15] Kerr and Kerr, "Immigrant Entrepreneurship in America."

[16] Jennifer Hunt and Marjolaine Gauthier-Loiselle, "How Much Does Immigration Boost Innovation?" *American Economic Journal: Macroeconomics* 2, no. 2 (2010): 31–56; Jennifer Hunt, "Which Immigrants Are Most Innovative and Entrepreneurial?" *Journal of Labor Economics* 29, no. 3 (2011): 417–57.

college degrees in STEM fields may make them more inclined to develop new products and to start businesses than is the average US citizen.[17]

Two recent papers provide evidence about this issue. Azoulay et al. use data from the US Census to examine business startups for the period 2005 to 2010.[18] They found that the firm count per capita for immigrants is higher than for natives at all firm sizes. Using the Census Bureau's Survey of Business Owners for 2012, the authors found that 7.25 percent of immigrants start firms compared with 4.03 percent of natives, nearly 80 percent higher. Wages at immigrant firms are 0.7 percent higher than at firms created by natives. Those immigrant-founded firms are also 35 percent more likely to have a patent. Looking at Fortune 500 businesses, immigrants have started more successful businesses than have natives.

Kerr and Kerr used the Census Bureau's Survey of Business Owners and its Longitudinal Business Database for the period 2008 to 2012 to examine immigrant entrepreneurship.[19] They found that first- and second-generation immigrants created approximately 40 percent of the Fortune 500 companies. They also found that first-generation immigrants created 25 percent of all new firms in the United States over the

---

[17] Kerr, *The Gift of Global Talent*; Kerr and Kerr, "Immigrant Entrepreneurship in America"; J. David Brown, John S. Earle, Mee Jung Kim, and Kyung Min Lee, "Immigrant Entrepreneurs and Innovation in the U.S. High-Tech Sector" (NBER Working Paper 25565, National Bureau of Economic Research, Cambridge, MA, 2019); Pierre Azoulay, Benjamin F. Jones, J. Daniel Kim, and Javier Miranda, "Immigration and Entrepreneurship in the United States" (NBER Working Paper 27778, National Bureau of Economic Research, Cambridge, MA, 2020).

[18] Azoulay, Jones, Kim, and Miranda, "Immigration and Entrepreneurship in the United States."

[19] Kerr and Kerr, "Immigrant Entrepreneurship in America."

period examined.[20] The Kerr and Kerr sample includes the Great Recession of 2008. There is evidence that startups increase during recessions as unemployed workers with limited job prospects are more likely to try starting a business as an alternative career option under those conditions.[21]

Startup business survival rates tend to be pro-cyclical, which means survival rates tend to decline during recessions and rise during expansions. According to the Kauffman Foundation, since 2012, survival rates for all startups have been stable, fluctuating between 79.2 and 79.7 percent. The survival rate during 2009, during the Great Recession, equaled 75.3 percent.[22]

Economist William Kerr used data from the US Census Bureau's Longitudinal Employer-Household Dynamics database to track immigrant entrepreneurship between 1995 and 2008.[23] The data tracked three different trends, and figure 1 illustrates the findings. First, the new firm share of all employees who are immigrants increased from 16.7 percent in 1995 to 25.6 percent in 2008. Second, the share of entrepreneurs who are immigrants has risen from 20.6 percent to 27.1 percent over the period. Finally, the share of new firms with at least one immigrant entrepreneur has grown from 31.1 percent in 1995 to 37.0 percent in 2008. These data show that immigrants are playing a growing

---

[20] This figure is significantly different from what Azoulay, Jones, Kim, and Miranda found (7.25 percent) because Azoulay et al.'s figure is the startup rate among the population of immigrants, whereas the Kerr and Kerr (25 percent) is the figure share of firms by immigrants.

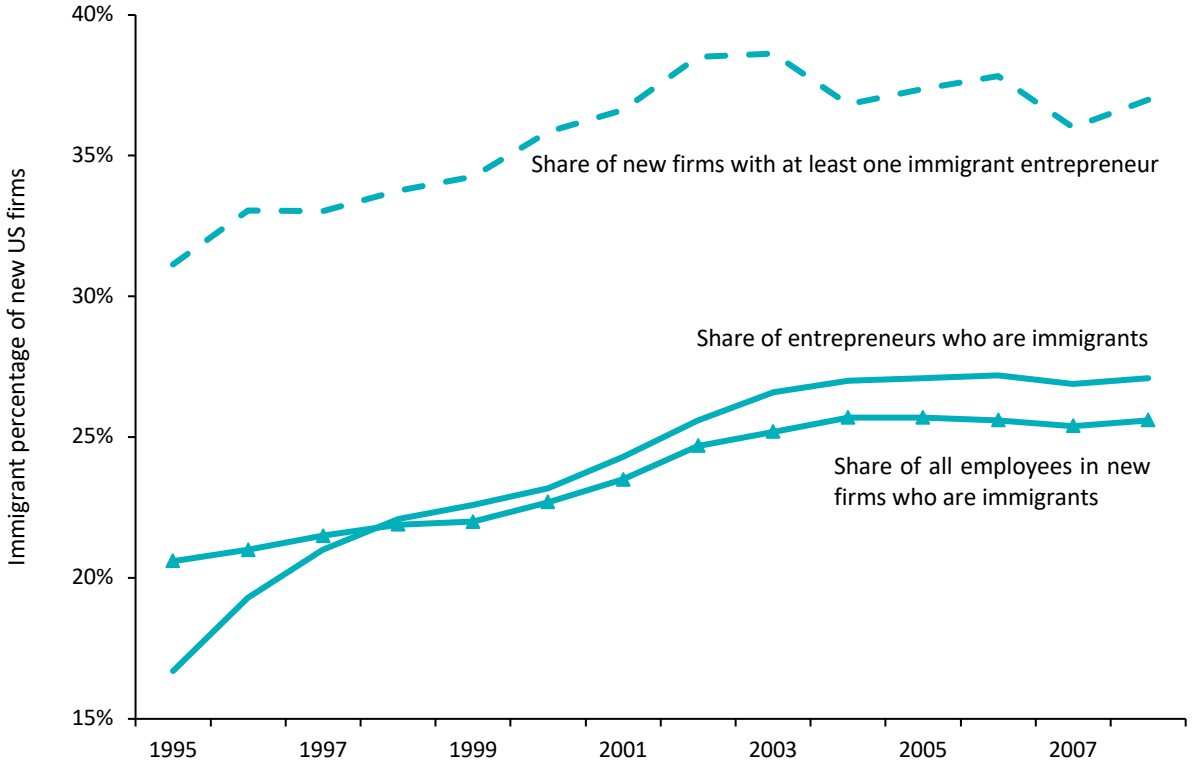
[21] Robert W. Fairlie, "Entrepreneurship, Economic Conditions, and the Great Recession," *Journal of Economics & Management Strategy* 22, no. 2 (2013): 207–31.

[22] Robert W. Fairlie and Sameeksha Desai, "2019 Early-Stage Entrepreneurship in the United States," national and state report, June 2020, Ewing Marion Kauffman Foundation, Kansas City, KS. They do not provide survival rates for immigrant startups.

[23] Kerr, *The Gift of Global Talent*.

entrepreneurial role in the US economy by starting new businesses. They also capture a larger share of employment in new firms.

Figure 1. Immigrant Entrepreneurship in the United States, 1995–2008



Source: Used with permission from William Kerr, *The Gift of Global Talent: How Migration Shapes Business, Economy & Society*, 2019.

William Kerr's 27.1 percent figure covering immigrant startups shows that in a rough approximation immigrants account for about 785,900 net jobs per year.[24]

Economists Sari Pekkala Kerr and William Kerr also provide a more detailed breakdown of immigrant entrepreneurs by sector and states.[25] They compared the

[24] This percentage is calculated by multiplying the share of immigrants that create startups by the 2.9 million net jobs created annually as estimated by Decker et al., "The Role of Entrepreneurship."

[25] Kerr and Kerr, "Immigrant Entrepreneurship in America."

percentage of firms started by immigrants—either alone or working with natives—in both the high- and low-tech sectors. In 2007, that group of entrepreneurs started 24.8 percent and 23.6 percent of high- and low-tech firms, respectively. Those figures rise to 28.6 percent and 25.5 percent, respectively, in 2012.

Kerr and Kerr also found that the industry composition of immigrant and native businesses is comparable with strictly native-owned firms. Although industry shares are not identical, immigrant and native firms do not appear to be disproportionally represented in highly cyclical industries. For example, in 2012, the share of native firms in construction equaled 13.4 percent, nearly double the 7.0 percent figure for immigrant and mixed businesses.

In some states such as California and New York, first- and second-generation immigrants created more than 40 percent of the new businesses over the period of 2008 to 2012. But there is a wide range at the state level. For example, first- and second-generation immigrants started only 5 percent of the new businesses in Idaho and North Dakota. Such differences reflect differences in the size of immigrant populations in those states. Immigrant businesses pay comparable wages but provide fewer benefits, such as 401K plans. Furthermore, immigrant firms are more engaged in international trade than are native startups. This engagement reflects a better understanding of foreign markets, especially in the countries they emigrated from.

Readers can conclude that immigrants tend to be entrepreneurial and to start a significant share of US businesses. Those new firms also make a significant contribution to employment growth in the United States.

Immigration and Innovation

A growing body of research confirms that immigrants play an important role in innovation and improved business efficiency in the United States and abroad. For example, two articles by Hunt—one co-authored with Gauthier-Loiselle—showed that immigrant graduates with science and engineering degrees had a patent rate double the average native rate for the period of 1940 to 2000.[26] When immigrant US patent share is compared with natives of similar educations, the difference is smaller. The authors pointed out that immigrants' share of US patents has increased significantly over the past 20 years. Using state-level US data, Hunt and Gauthier-Loiselle estimated that a 1 percent increase in immigrant college graduates as a share of the population increases the number of patents per capita by 9 to 18 percent.[27]

However, the aging population in the United States will lead to a decline in business startups and innovation over time.[28] Expanding immigration can moderate those forces to help stabilize long-term economic growth. So, in addition to starting businesses, many of those businesses are highly innovative. Immigrants bring new ideas about potential new products and better ways to produce existing products or services.

---

[26] Hunt and Gauthier-Loiselle, "How Much Does Immigration Boost Innovation?"; Hunt, "Which Immigrants Are Most Innovative and Entrepreneurial?".

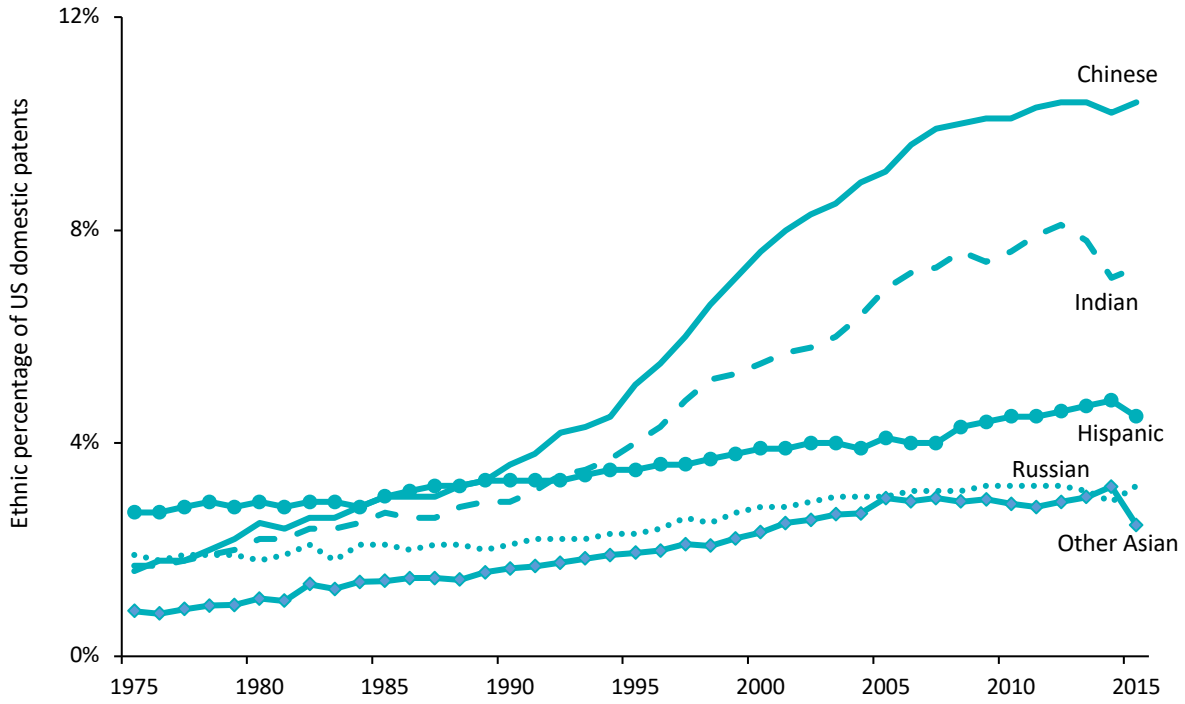
[27] Hunt and Gauthier-Loiselle, "How Much Does Immigration Boost Innovation?"

[28] James Liang, Hui Wang, and Edward P. Lazear, "Demographics and Entrepreneurship," *Journal of Political Economy* 126, no. 51 (2018): S140–S196; Charles Jones, "The End of Economic Growth? Unintended Consequences of a Declining Population" (NBER Working Paper 26651, National Bureau of Economic Research, Cambridge, MA, 2020); Nicholas Bloom, Charles I. Jones, John Van Reenen, and Michael Webb, "Are Ideas Getting Harder to Find?" *American Economic Review* 110, no. 4 (2020): 1104–44.

William Kerr uses a computer program that determines the ethnicity of a patent holder by using the person's first and last name.[29] Drawing on data from the US Patent and Trademark Office, he was able to determine the ethnic composition of US patents between 1975 and 2015. Figure 2 illustrates those results. Anglo-Saxon and European names captured 91 percent of US patents in 1975. By 2015, that percentage declined to 72 percent. In 1975, names indicating Chinese and Indian ethnicity represented only 1.6 and 1.7 percent, respectively, of US patents. However, they represented the largest increases over the period. By 2015, individuals with Chinese and Indian names captured 10.4 percent (a 6.5-fold increase) and 7.3 percent (a 4.3-fold increase), respectively, of all US patents. This finding illustrates how immigrants are innovative and are growing contributors to US patents and innovation. Once again, we can see the growing role played by those immigrants in high-technology sectors that range from drugs and medical to computers and communication.

[29] Kerr, *The Gift of Global Talent*; William R. Kerr, "The Ethnic Composition of U.S. Inventors" (Harvard Business School Working Paper No. 08-006, Cambridge, MA, 2008).

Figure 2. Share of US Patents by Ethnicity, 1975–2015



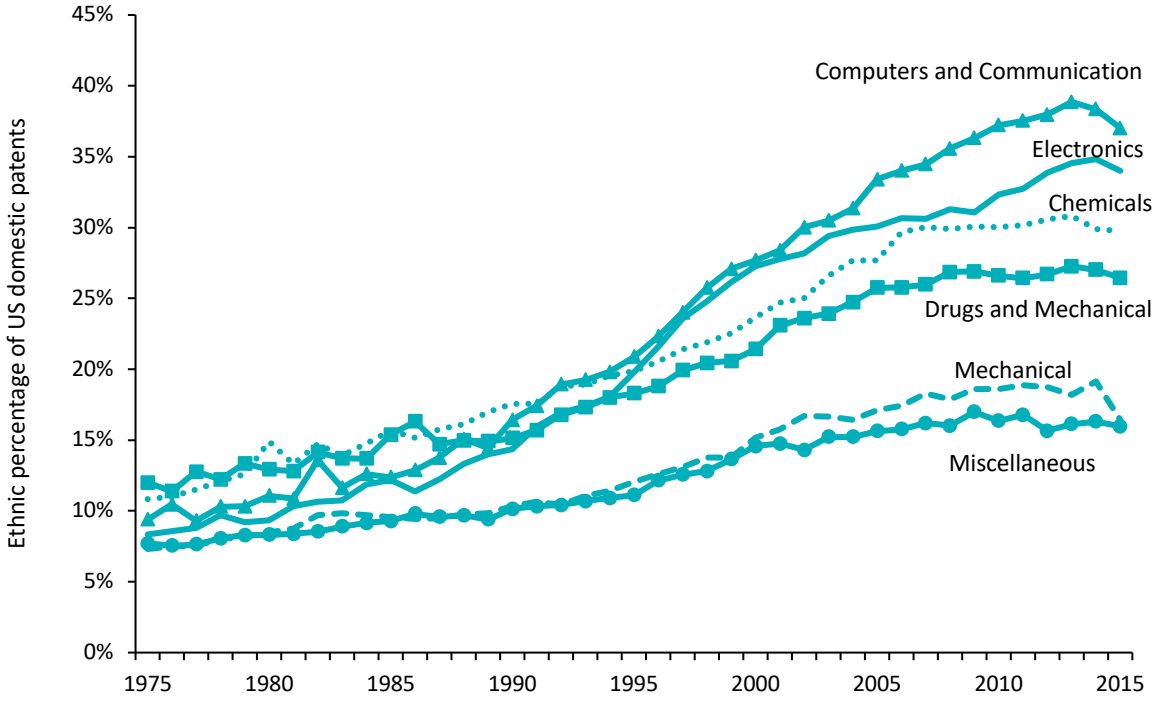
Source: Used with permission from William Kerr, *The Gift of Global Talent: How Migration Shapes Business, Economy & Society*, 2019.

Moreover, Kerr provides a breakdown of which sectors immigrants contributed to with their creation of US domestic patents from 1975 to 2015. Figure 3 illustrates those results. Bernstein et al. use a database that provides individual data for 160 million adults living in the United States.[30] The data include the first five digits of the person's Social Security number, as well as name, living addresses, year of birth, and gender. The first five digits allow the researchers to determine the year the individual got a Social Security number. Most natives get those numbers when they are born, when they are relatively young, or

[30] Shai Bernstein, Rebecca Diamond, Timothy McQuade, and Beatriz Pousada, "The Contribution of High-Skilled Immigrants to Innovation in the United States" (Stanford University Business School Working Paper, Stanford, CA, 2019). The authors use the Infutor database to determine who is an immigrant.

when they get their first job at age 16. Berstein et al. identify immigrants as individuals who get their Social Security number in their 20s or later.[31] The authors merge (link) an individual's immigration status determined in the first data set with patent data from the US Patent and Trademark Office. Thus they find that 23 percent of all patents went to immigrants between 1976 and 2012. This number is 40 percent higher than their share of the US inventor population. The high number of patent citations indicates that the patents tend to be of high quality.

Figure 3. Ethnic Percentage of US Domestic Patents by Sector, 1975–2015



Source: Used with permission from William Kerr, *The Gift of Global Talent: How Migration Shapes Business, Economy & Society*, 2019.

[31] An advantage of this approach over Kerr's method is that it can consider immigrants from European nations. Measurement error is less likely. However, some immigrant inventors may have come to this country when they were young. They would be counted as natives.

Bernstein et al. also investigate the possibility of spillover effects from an increase in immigrant inventors over the productivity of native inventors. They estimate the impact of a collaborator's premature death (age is less than 60 years) on the productivity of the living collaborator in the future. They find the death of an immigrant collaborator reduces the native coauthor's productivity (patents or patent citations) over time by 50 to 65 percent. If the premature death involves a native collaborator, the productivity of the immigrant coauthor declines less, between 28 and 35 percent.

Not surprisingly, there are clear spillover benefits from research collaboration. However, on the basis of those estimates, native inventors appear to gain more. The spillover benefits are the result of effectively combining the different knowledge and experience that each coauthor brings to any project. The larger influence of the immigrant collaborator may be caused by their bringing to research projects a foreign or possibly larger global knowledge base that differs from that of the average native coauthor.

Peri, Shih, and Sparber showed that foreign-born STEM workers were associated with an increase in productivity and wages in the authors' sample of 219 US cities during the period of 1990 to 2010.[32] In addition, they estimated that increases in foreign STEM workers could explain between one-third and one-half of aggregate growth in total factor

[32] Details about such results will be discussed in the next section. Giovanni Peri, Kevin Shih, and Chad Sparber, "STEM Workers, H-1B Visas, and Productivity in US Cities," *Journal of Labor Economics* 33, no. S1 (part 2, July 2015): S225–S255. Other papers include J. David Brown, John S. Earle, Mee Jung Kim, and Kyung Min Lee, "Immigrant Entrepreneurs and Innovation in the U.S. High-Tech Sector" (NBER Working Paper 25565, National Bureau of Economic Research, Cambridge, MA, 2019); Gaurav Khanna and Munseob Lee, "High-Skill Immigration, Innovation, and Creative Destruction" (NBER Working Paper 24824, National Bureau of Economic Research, Cambridge, MA, 2018).

productivity in the United States during that period. They estimated that this finding translated into native per capita income's being 10 percent higher in 2010.[33]

If immigrants have different complementary skills when compared with native workers, then with immigration, native workers can specialize and can take on the tasks they are best at. The result would be an increase in efficiency and lower costs. For example, as immigration increases, native workers shift into jobs that are more language intensive (sales and management). Immigrants focus on jobs that require fewer language skills, such as programming or construction. This increase in skill diversity and greater specialization improves productivity.

Peri examined the effects of increased immigration on long-term productivity growth in the 50 states and Washington, DC, in 1960, 2000, and 2006.[34] He found that immigration raised state growth in total factor productivity. He estimated that between one-third and one-half of the productivity growth increase had been caused by improved (more efficient) specialization of job tasks related to the increase in immigration.

Research has also looked at the effects of immigration at the firm level. Creative destruction is an important way in which innovation promotes economic growth. Superior products, services, or production methods of a new entrant will replace those of older incumbent firms. Khanna and Lee found that a 10 percent increase in H-1B (immigrant)

---

[33] Charles I. Jones, "Sources of U.S. Economic Growth in a World of Ideas," *American Economic Review* 92, no. 1 (2002): 220–39. For the period of 1950 to 1993, Jones estimates that about 80 percent of the growth in output per worker is the result of increases in education and in the share of scientists and engineers as a percentage of the work force. Because ideas can spread quickly across borders, Jones measures totals of scientists and engineers from France, West Germany, Japan, the United Kingdom, and the United States during that period.

[34] Giovanni Peri, "The Effect of Immigration on Productivity: Evidence from U.S. States," *Review of Economics and Statistics* 94, no. 1 (2012): 348–58.

workers results in a 2 percent increase in firm entry and exit (increased creative destruction) across a wide set of US industrial sectors.

Brown et al. used data from the US Census Bureau's Annual Survey of Entrepreneurs to compare the innovation activities of immigrants with those of natives in high-tech industries at the firm level. After controlling for demographic factors, startup financial resources, and specific industry, they found higher levels of innovative activities among immigrants. Immigrants were associated with higher rates of product and production process innovation, higher research and development, and more patents granted or pending than were natives. Interestingly, despite higher levels of patents, the same data show that immigrants had fewer copyrights and trademarks, perhaps owing to the nature of the type of products (arts and marketing versus technology) for which copyrights and trademarks are sought. Those results and the higher level of patent activity are significant only when control variables are excluded from the empirical model.[35]

Ganguli et al. argue that one possible explanation for those results is that immigrants self-select from the right tail (high-skilled individuals) of the ability distribution. Furthermore, they argue that the right tail of the ability distribution is fatter than that of natives.[36] This finding implies that immigrants have a larger percentage of individuals with STEM degrees or backgrounds. Hanson and Slaughter provide evidence that US

---

[35] J. David Brown, John S. Earle, Mee Jung Kim, and Khyung Min Lee, "Immigrant Entrepreneurs and Innovation in the US High-Tech Sector," in *The Roles of Immigrants and Foreign Students in US Science, Innovation, and Entrepreneurship*, ed. Ina Ganguli, Shulamit Kahn, and Megan MacGarvie (Chicago: University of Chicago Press, 2020), 149–71.

[36] Ina Ganguli, Shulamit Kahn, and Megan MacGarvie, "Introduction," in *The Roles of Immigrants and Foreign Students in US Science, Innovation, and Entrepreneurship*, ed. Ina Ganguli, Shulamit Kahn, and Megan MacGarvie (Chicago: University of Chicago Press, 2020), 1–14.

immigrants are overrepresented in STEM-related employment. This evidence is especially true for individuals with advanced degrees in STEM areas. For example, considering the workforce with PhDs, in 2013, foreign-born individuals between the ages of 25 and 54 made up 28.9 percent of hours worked by this elite population and 54.5 percent of STEM hours worked.[37]

Also, studies using firm data from the United Kingdom and France find that where there are more immigrants, more productivity increases, which suggests more innovation and improvements in efficiency occur within the affected firms.[38]

The research presented in this section indicates that immigrants tend to be innovative. This result is attributed to a large percentage of immigrants with STEM degrees. The share of US patents going to immigrants has significantly increased over time. Immigrant inventors are a complement to native inventors, thus raising their productivity over time.

Conclusions

The purpose of this paper is to summarize the current research about immigration, entrepreneurship, and innovation. The research examined in this paper provides evidence that immigration, especially among high-skilled entrepreneurial immigrants, increases innovation and firm startups. The share of US patents going to foreign-born individuals is

---

[37] Gordon H. Hanson and Matthew J. Slaughter, "High-Skilled Immigration and the Rise of STEM Occupations in US Employment," in *Education, Skills, and Technological Change: Implications for Future US GDP Growth*, ed. Charles Hulten and Valerie Ramey (Chicago: University of Chicago Press, 2019).

[38] Gianmarco Ottaviano, Giovanni Peri, and Greg C. Wright, "Immigration, Trade, and Productivity in Services," *Journal of International Economics* 112 (2018): 88–108; Cristina Mitaritonna, Gianluca Orefice, and Giovanni Peri, "Immigrants and Firms' Productivity: Evidence from France," *European Economic Review* 96 (2017): 62–82.

growing significantly. Higher levels of skilled immigrants increase patents in the United States. High-skilled immigrants make native innovators more productive. This finding tells us that immigrants are playing a growing and important role in the production of significant new ideas, which is the principal engine of growth in the United States, thereby raising the standard of living of all US citizens.

Expanding immigration would be a desirable policy reform. Family-based visas do not have the same effect on innovation and entrepreneurship as do skill- and employment-based visas. This finding does not imply that, as a country, we should stop issuing family reunification visas. The same is true with respect to refugees. The visa policies for such groups are created for humanitarian reasons. However, the United States should consider expanding the number of visas issued to foreign-born entrepreneurs and to individuals with STEM degrees. At a minimum, the country can set the H-1B visa quota at a level that more closely matches demand.[39]

[39] Daniel Griswold, "Coming to America: Finally Fixing Legal Immigration," *Discourse* (Mercatus Center at George Mason University, Arlington, VA, November 10, 2020): 1–12; Liya Palagashvili and Patrick O'Connor, "Unintended Consequences of Restrictions on H-1B Visas" (Mercatus Policy Brief, Mercatus Center at George Mason University, Arlington, VA, 2021).