

THE 2019 FOREIGN-BORN U.S. NOBEL LAUREATES

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Key Findings

1. In 2019, four of eight Nobel Prize winners from the United States (50 percent) are foreign-born individuals.*
2. Eleven of 14 Nobel Prize winners in 2019 have been associated with a U.S. institution of higher education at some point in their lives.
3. Throughout the history of the Nobel Prize, 143 immigrants to the United States have won a Nobel Prize. These 143 individuals account for 15 percent of all Nobel Laureates since 1901 and 34 percent of all U.S. winners. In the past 19 years, there has been an increasing trend in the frequency of foreign-born U.S. Nobel Prize winners.
4. The top three countries of origin of foreign-born U.S. Nobel Prize winners between 1901 and 2019 are Germany, the United Kingdom, and Canada.
5. The largest share of foreign-born U.S. Nobel Prize winners has been awarded the prize in Physics. Thirty-one percent of all immigrant U.S. Nobel laureates have won the Physics prize.
6. Immigrants, and children of immigrants, are prominent in other prestigious awards as well. For example, in 2019, six of the 26 MacArthur Fellows are foreign born and, since 1981, 226 of 1,040 total MacArthur Fellows were born outside of the United States. The top three countries of birth for foreign-born MacArthur fellowship winners are the United Kingdom, China, and Canada.
7. Changes to U.S. immigration policies may threaten the ability of scholars to study, work, and research in the United States and for U.S. researchers to collaborate internationally with other researchers.

* Please note that the terms “immigrant” and “foreign-born” are used interchangeably throughout this report. Foreign-born refers to individuals who are not a U.S. citizen at birth or who were born outside the U.S., Puerto Rico or other U.S. territories and whose parents are not U.S. citizens. The foreign-born may include naturalized U.S. citizens, Legal Permanent Residents, temporary residents, refugees and asylees, and others. Native born includes those who are U.S. citizens at birth, those born in the United States, Puerto Rico, or other U.S. territories, and those born abroad to a parent who is a U.S. citizen.

Introduction

The Nobel Prize, established by Alfred Nobel, has been given to outstanding individuals who accomplish work “for the greatest benefit to humankind” within their lifetimes. The prize, which was first awarded in 1901, is presented to individuals in the fields of Physics, Medicine, Chemistry, Peace, and Literature. The Sveriges Riksbank prize in Economic Sciences was established in 1968.¹ Throughout the history of the Nobel Prize, 143 immigrants to the United States – foreign-born individuals who immigrated permanently to the United States or were at a U.S. institution of higher learning at the time they received the award – have won a relatively large share of these awards. These 143 individuals account for 15 percent of all Nobel Laureates since 1901 and 34 percent of all U.S. winners.²

In this report, Nobel Laureates are identified by the country of residence and university or research institution with which they were affiliated at the time of the Nobel Prize announcement, not by country of citizenship. Therefore, we categorize a foreign-born individual working at a U.S. university or living in the United States at the time of the award as a U.S. winner. We distinguish between native-born U.S. winners and foreign-born U.S. winners, based on the biographical information provided by the Nobel Prize administrators or official university biographies. The foreign-born winners may be naturalized U.S. citizens, legal permanent residents, or temporary residents.

In 2019, four foreign-born U.S. individuals won Nobel Prizes in the fields of Physics, Chemistry, and Economic Sciences. James Peebles, born in Canada, and Stanley Whittingham, born in the United Kingdom, won the Physics and Chemistry prizes respectively. Esther Duflo, born in France, and Abhijit Banerjee, born in India, jointly won the prize for Economic Sciences. Esther Duflo is not only a foreign-born U.S. winner, but is also the youngest Economic Sciences Nobel Prize winner to date.³ Additionally, three of the Nobel Laureates from countries other than the United States in 2019 were either students, teachers, or researchers at U.S. institutions of higher education at some point in their lives.

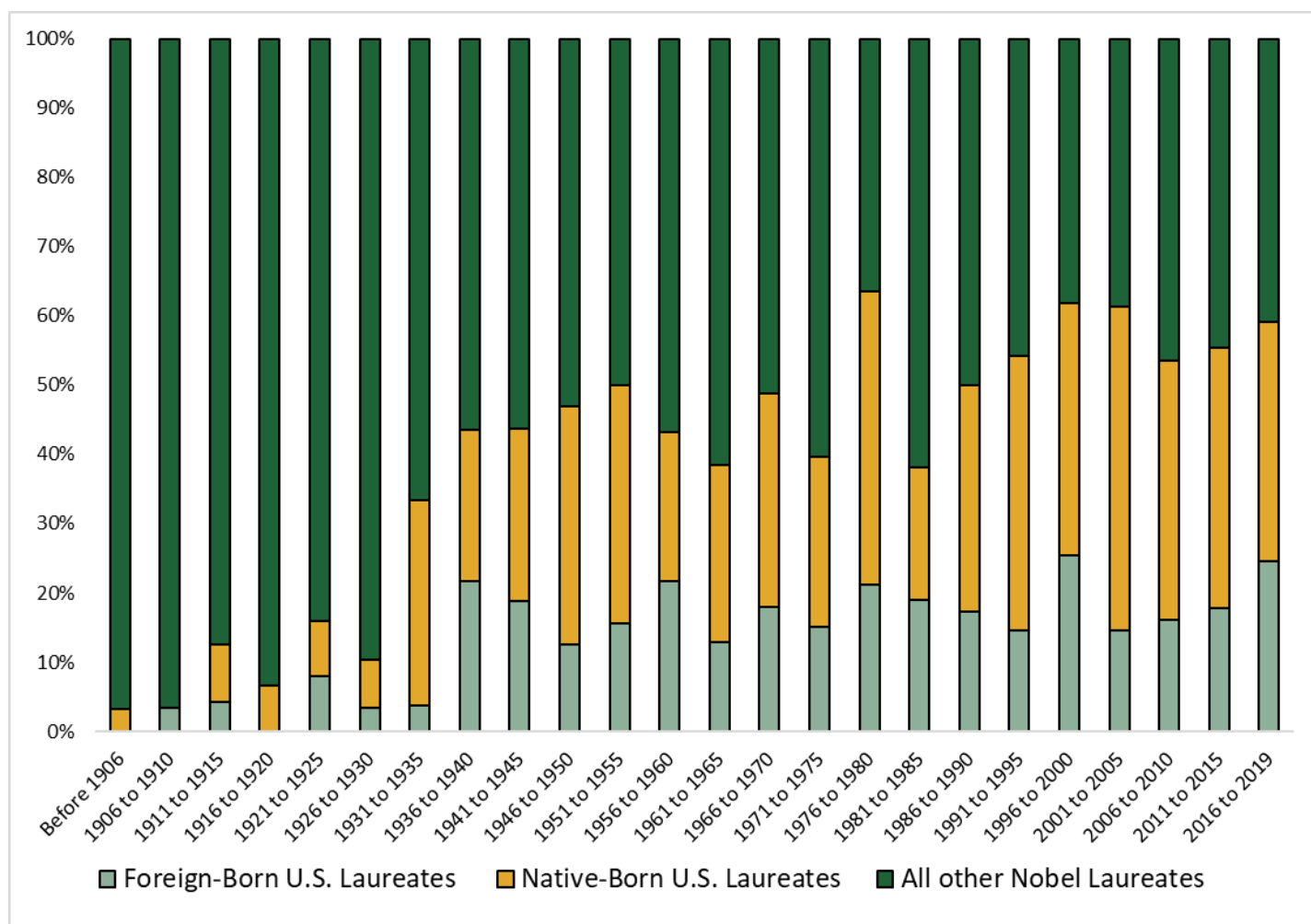
Their stories, like those of many other immigrants, are stories of coming to the United States to follow their dreams, conduct research, and make important contributions to the world. Many of these immigrants and their children have been extremely successful. In fact, research has shown that immigrants, and children of immigrants, are highly likely to win academic awards.⁴ For example, in addition to Nobel Laureates, a large share of MacArthur Fellows, Rhodes Scholars, the International Prize for Biology winners, and Intel Science Talent Search winners are immigrants and children of immigrants.

Furthermore, international collaboration is vitally important to the advancement of science and knowledge. Many of the Nobel Laureates work with each other across international boundaries to pursue their research and draw their conclusions. The ability to travel, study, and work internationally is a necessary component of scientific research in the twenty-first century.

Immigrant Nobel Prize Winners Throughout the Years

In the past 19 years, there has been an increasing trend in the frequency of immigrant Nobel Prize winners, and since 2016, there have been 12 U.S. Nobel Prize winners who were foreign born. In fact, as the National Foundation for American Policy points out, and as Figure 1 shows, there was a much higher number of foreign-born U.S. Nobel Prize winners in the second half of the twentieth century than in the first.⁵ In the five-year period between 1996 and 2000, there were 14 immigrant winners.

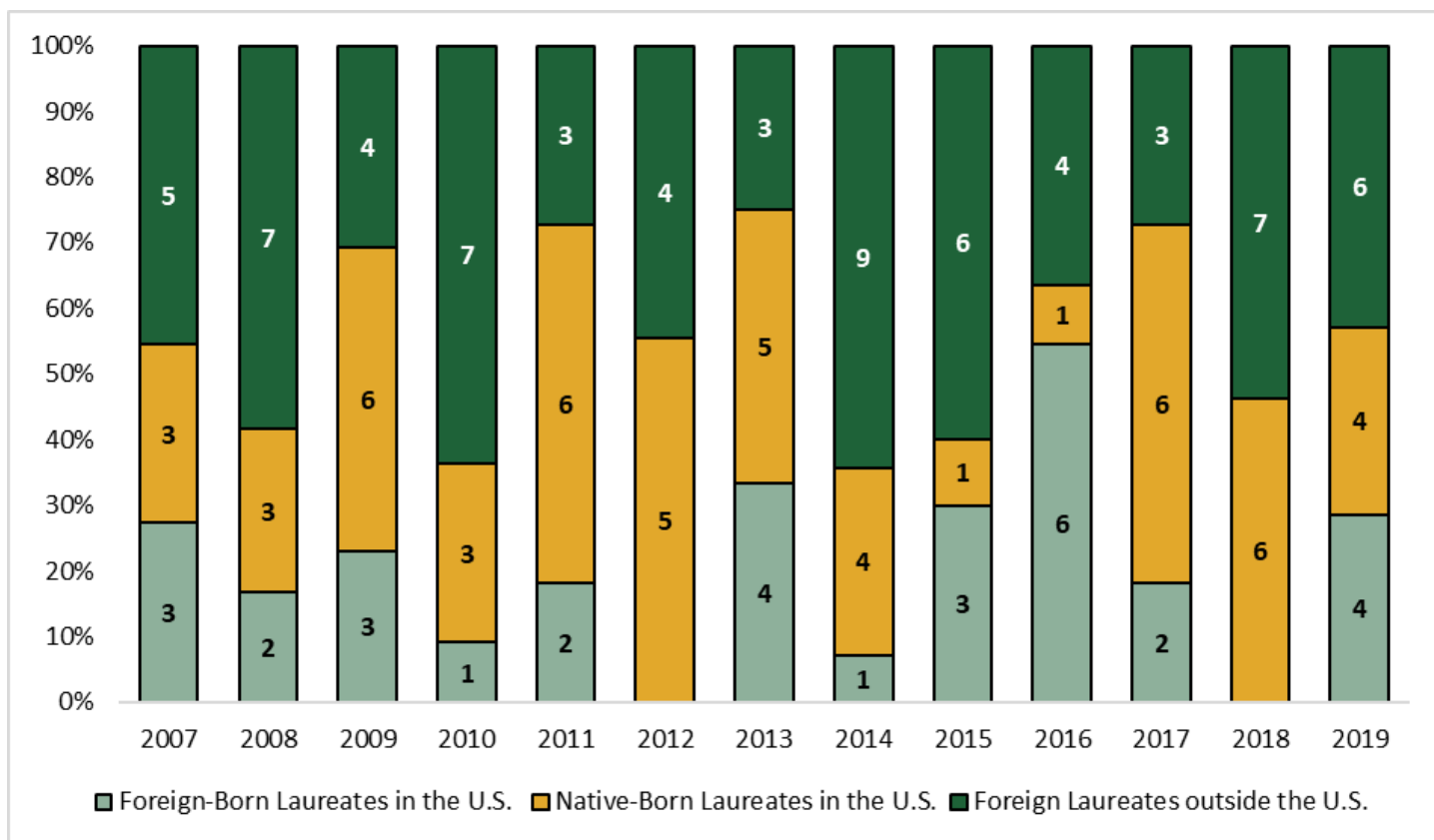
Figure 1. Percentage of U.S. Born and U.S. Immigrant Nobel Laureates Compared to Total Nobel Laureates, 1901-2019



Source: IIR Analysis of all Nobel Prize winners Accessed October 15, 2019. <https://www.nobelprize.org/prizes/lists/all-nobel-prizes/>

In 2019, there are four foreign-born U.S. winners, four native-born U.S. winners, and six Nobel Laureates from countries other than the United States (Figure 2).⁶ In the last 12 years, the greatest number of foreign-born U.S. winners (6 winners) occurred in 2016. The years 2013 and 2019 each had four immigrant winners. The total number of foreign-born winners in the past four years (2016-2019) is greater than the total of the five previous years (2011-2015).

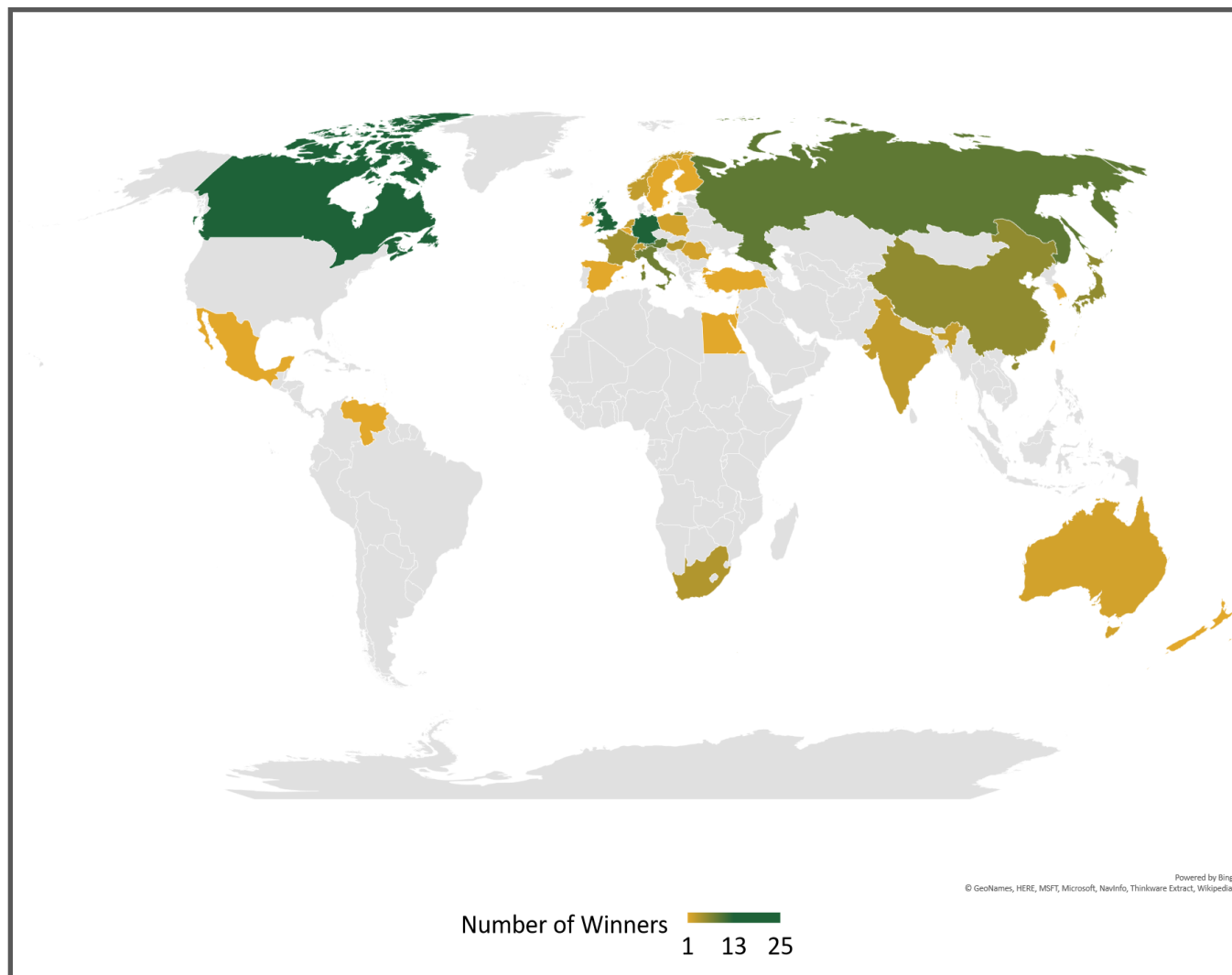
Figure 2. U.S.-Born and Foreign-Born U.S. Nobel Laureates, 2007-2019



Source: IIR Analysis of all Nobel Prize winners. Accessed October 15, 2019. <https://www.nobelprize.org/prizes/lists/all-nobel-prizes/>

Figure 3 illustrates the country of origin of all 143 foreign-born U.S. Nobel Prize winners. The top three countries of origin have been Germany (25), the United Kingdom (18), and Canada (14). These are followed by Russia (9), Italy (8), and Austria (7). The top two Asian countries of origin are China (6) and Japan (6).

Figure 3. Foreign-Born U.S. Nobel Laureates by Country of Origin, 1901-2019*

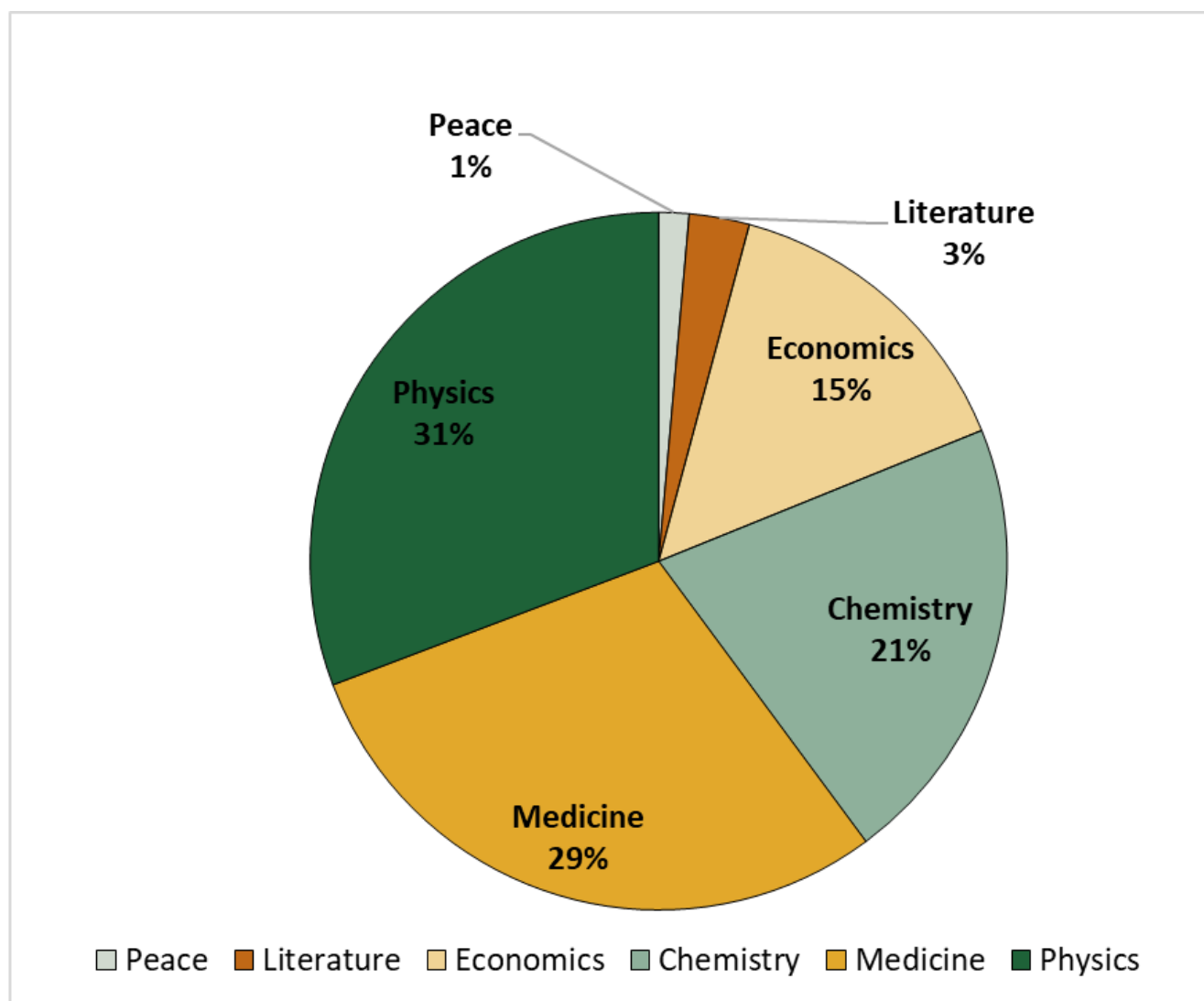


Source: IIR Analysis of all Nobel Prize winners. Accessed October 15, 2019. <https://www.nobelprize.org/prizes/lists/all-nobel-prizes/>

* Winners from countries that have been reconfigured have been assigned to the country that now inhabits that area. For example, winners from West Germany and Prussia are included in Germany. Winners from the Russian Empire and Soviet Union Russia are included in Russia.

Figure 4 presents all foreign-born U.S. Nobel Prize winners between 1901 and 2019 by Nobel Prize category. The largest share of foreign-born Nobel Prize winners has been in Physics (31 percent), followed closely by Medicine (29 percent). Foreign-born Nobel Prize winners from the United States are much more likely to be in the Science, Technology, Engineering, and Mathematics (STEM) related fields than in the Literature and Peace prizes. The Economic Sciences prize has a smaller share of immigrant winners (15 percent) than the STEM fields, but this is likely due to the fact that this prize was only instituted in 1968.

Figure 4. U.S. Foreign-Born Nobel Prize Winners by Prize Category, 1901-2019



Source: Source: IIR Analysis of all Nobel Prize winners. Accessed October 15, 2019. <https://www.nobelprize.org/prizes/lists/all-nobel-prizes/>

The 2019 Foreign-Born U.S. Nobel Laureates

In 2019, four of the eight U.S. Nobel Prize winners were individuals who were born in a foreign country and who immigrated permanently to the United States or were at a U.S. institution at the time they received the award.

Nobel Prize in Physics

James Peebles won the Nobel Prize for Physics for his work on theoretical discoveries in the field of Physical Cosmology.⁷ Peebles was born in Winnipeg, Canada on April 25, 1935 and is currently Professor Emeritus and Albert Einstein Professor of Science at Princeton University. Peebles' interests are in the area of physical cosmology. He explains,

I continue to work in physical cosmology, with preference for underappreciated issues... What might we learn from lines of research that are off the beaten track? They check accepted ideas, always a Good Thing, and there is a chance Nature has prepared yet another surprise for us.⁸

Peebles' Nobel-winning work involved investigations into background radiation in the universe, which theoretically stems from the original Big Bang moment. His analysis of these traces of the infancy of the universe led him to the startling conclusion that only five percent of the total energy density in the universe at the present time consists of baryonic matter, which exists in the form of nucleons in stars and clouds of gas.⁹ His work opened up the field to further investigations into the sources of critical density in the universe.



P. James Peebles. Photo by Princeton University

Nobel Prize in Chemistry

M. Stanley Whittingham is one of three winners of the 2019 Nobel Prize in Chemistry for his work on the development of the lithium-ion battery.¹⁰ He was born in the United Kingdom on December 22, 1941, and is currently Professor of Chemistry at Binghamton University, State University of New York. He is also director of the Institute for Materials Research at this same institution and is currently a member of the National Academy of Engineering. Whittingham received his bachelor's and master's degrees in Chemistry from Oxford University in 1964 and 1967, respectively.¹¹ He received his PhD from Oxford in 1968. He first came to the United States in 1968 as a postdoctoral fellow at Stanford University.

In general, Whittingham's work revolved around developing fossil fuel-free technologies.¹² Along with the other winners of the 2019 Chemistry Prize, Whittingham worked on technologies that made possible the lithium-ion batteries, which are used widely today in cellphones and as storage batteries for solar and wind-power.¹³ He discovered an energy-rich material that could be used as an innovative cathode in a lithium battery.

John B. Goodenough, another of the 2019 Nobel Prize winners for Chemistry, was born in Jena, Germany in 1922, and emigrated to the United States in his youth. However, he is the son of a U.S. citizen and was therefore a U.S. citizen at birth.¹⁴ He came to the United States after living several years in Germany, meaning that he likely had to accustom himself to U.S. culture and did so successfully, eventually resulting in his stellar work on batteries and his Nobel Prize. He is also the oldest Nobel Laureate in the history of the prize.



M. Stanley Whittingham and John B. Goodenough
Photos by Binghamton University and the University of Texas.

Nobel Prize in Economic Sciences

Esther Duflo won the 2019 Nobel Sveriges Riksbank Prize for Economic Sciences for her experimental approach to alleviating global poverty.¹⁵ She was born on October 25, 1972 in Paris, France, and received her degrees in History and Economics from the Ecole Normale Supérieure in Paris and her PhD in Economics from MIT in 1999.¹⁶ She is currently the Abdul Latif Jameel Professor of Poverty Alleviation and Development Economics at the Massachusetts Institute of Technology (MIT). The focus of her research is to “understand the economic lives of the poor, with the aim of designing and evaluating social policies.”¹⁷ Together with her husband, Abhijit Banerjee, she wrote *Poor Economics: A Radical Rethinking of the Way to Fight Global Poverty*. Duflo is the youngest Nobel Economic Sciences prize winner at 46 years old.¹⁸

Abhijit Banerjee won the 2019 Nobel Sveriges Riksbank Prize for Economic Sciences for the same experimental approach used by Esther Duflo to alleviate poverty.¹⁹ Banerjee was born in Mumbai, India on February 21, 1961, and received his initial education at the University of Calcutta and the Jawaharlal Nehru University. He later attended Harvard University where he received his PhD in 1988.²⁰ He is currently the Ford Foundation International Professor of Economics at MIT. Banerjee is one of the directors of the MIT Abdul Latif Jameel Poverty Action Lab.²¹ The work of Duflo and Banerjee builds upon the work of U.S.-born Michael Kremer, the third 2019 Nobel Prize winner in Economics. Together, their work in economics, agriculture, education, and health helped to alleviate poverty for millions of people around the world.²² As a result of their studies, five million Indian children received remedial tutoring in schools, and many countries received subsidies for preventive healthcare.²³



Esther Duflo and Abhijit Banerjee. Photos by MIT.

Nobel Prize Laureates and U.S. Institutions of Higher Education

U.S. institutions of higher education have played a prominent role in the Nobel Prize.²⁴ These institutions tend to be the entry point for many foreign academics and scientists who later go on to win Nobel Prizes. Eleven of this year's 14 Nobel Prize winners were involved with a U.S. institution of higher education at some point in their lives. All eight native- and foreign-born U.S. winners were involved with U.S. institutions, and three out of the six foreign Laureates had this connection to the United States as well (Table 1).

Table 1. 2019 Nobel Prize Laureates and U.S. Institutions of Higher Education

Name	Field	Country of Birth	Affiliation with U.S. Higher Education Institutions
Foreign-Born U.S. Winners			
Abhijit Banerjee	Economic Sciences	India	Massachusetts Institute of Technology (MIT), Harvard, Princeton
Esther Duflo	Economic Sciences	France	MIT, Princeton
James Peebles	Physics	Canada	Princeton
M. Stanley Whittingham	Chemistry	United Kingdom	Binghamton SUNY, Stanford University
Native-Born U.S. Winners			
John B. Goodenough	Chemistry	Germany	University of Texas, Yale, University of Chicago, MIT
William G. Kaelin Jr.	Medicine	United States	Harvard Medical, Howard Hughes Medical Institute, Duke, Johns Hopkins
Michael Kremer	Economic Sciences	United States	Harvard, MIT, University of Chicago
Gregg L. Semenza	Medicine	United States	Johns Hopkins, Harvard, University of Pennsylvania, Duke
All Other Winners			
Abiy Ahmed Ali	Peace	Ethiopia	Ashland University (Leadstar College of Management and Leadership in Addis Ababa, partnership)
Peter Handke	Literature	Austria	None known.
Michel Mayor	Physics	Switzerland	University of Hawaii (Institute for Astronomy)
Didier Queloz	Physics	Switzerland	MIT (Kavli Institute)
Sir Peter J. Ratcliffe	Medicine	United Kingdom	None known.
Akira Yoshino	Chemistry	Japan	None known.

International Collaboration Among Nobel Prize Winners

Scientific collaboration across international borders has been one important aspect of the process that leads to earning a Nobel Prize. As Swedish Ambassador to the United States Karin Olofsdotter stated in 2018, “Science and education are borderless.”²⁵ Through educational institutions, as well as through the scientific process of discovery itself, international collaboration is a constant activity between scientists, whether it happens with individuals working in different countries, or individuals from multiple countries working together in the United States or some other country. This is no less true of the Nobel Prize winners, many of whom collaborated with an international array of peers working across national boundaries to develop their award-winning research.

One of the most salient cases of international collaboration between this year’s Nobel Prize winners is that of Michel Kremer (United States), Esther Duflo (France) and Abhijit Banerjee (India) who converged in the Boston metro area and worked together to develop “a new, rigorous, practical, and incremental approach to fighting poverty.”²⁶ Kremer’s work was initially applied in western Kenya, while Duflo and Banerjee would later apply this experimental research model in India.²⁷ The three individuals from three different countries would often work together and published several research papers together.²⁸ According to Kremer, “It can often seem like the problems of global poverty are intractable, but over the course of my lifetime and career, the fraction of the world’s people living in poverty has dropped dramatically.”²⁹

Sharing scientific knowledge across international boundaries was also behind this year’s Nobel Prize in Chemistry. English-born Stanley Whittingham’s initial discovery of metallic lithium for the lithium-ion battery was later improved upon by John B. Goodenough.³⁰ Goodenough later created a cathode made of metal sulphide for Whittingham’s prototype, and this resulted in a battery that would produce twice as many volts as Whittingham’s model by using cobalt oxide. The research behind this advancement between the two scientists was later used by yet another international peer, Akira Yoshino from Japan.³¹ Yoshino, the third winner of the Nobel Prize in Chemistry this year, took Goodenough’s cathode technology as the basis for creating the first commercially available lithium-ion battery in 1985.

This year’s Nobel Prize winners in Medicine, Americans William Kaelin and Gregg Semenza, and Peter J. Ratcliffe of Great Britain, built upon each other’s work about how the body adapts to low oxygen levels.³² Kaelin and Ratcliffe worked together on research about oxygen sensing in cells, resulting in the publication of their work in 2008.³³ Semenza’s work was also closely related to that of the other two researchers.³⁴ All three Nobel Prize winners published a research paper together about pathways for oxygen regulation and homeostasis.³⁵

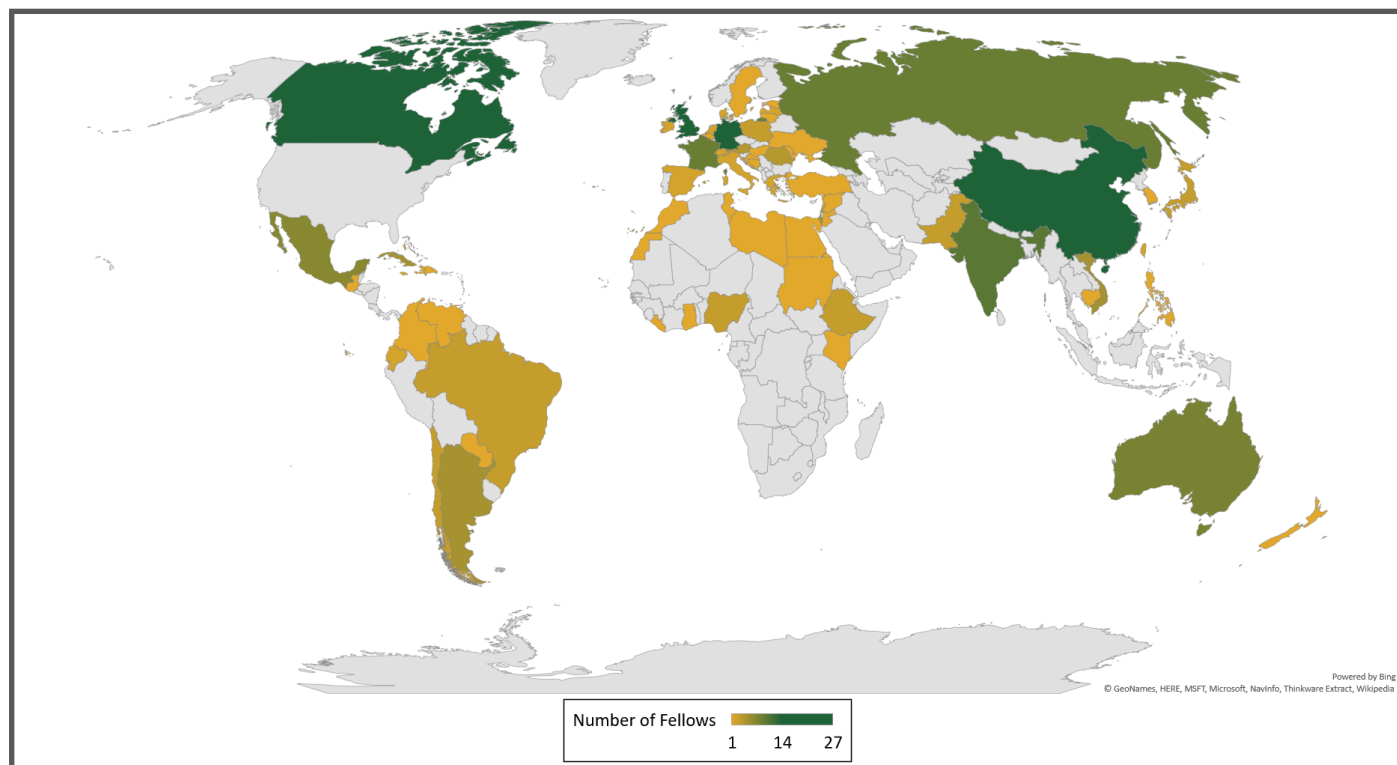
Similarly, French-born Gerard Mourou and Canadian Donna Strickland, winners of the Nobel Prize in Physics in 2018, collaborated at the University of Rochester and published several research articles together to accomplish the work on chirped pulse amplification (CPA), which would earn them the Nobel Prize.³⁶ All of these cases illustrate the importance of international collaboration for scientific discovery and the vital role that U.S. institutions of higher learning play in the careers of Nobel Laureates.

Immigrant MacArthur Fellows and Rhodes Scholars and Other International Prizes

Similar to the Nobel Prize, other prestigious international awards are frequently won by immigrants to the United States. For example, a significant share of the winners of the MacArthur Fellowship and Rhodes Scholarships have been immigrants. Moreover, four out of fifteen American winners of the International Prize for Biology between 1985-2017, were immigrants to the United States.³⁷

The MacArthur Fellowship is a prize awarded by the John D. and Catherine T. MacArthur Foundation every year to Americans who work on original and creative pursuits.³⁸ MacArthur Fellowship nominees and winners must be either residents or citizens of the United States.³⁹ Since 1981, 226 out of 1,040 total MacArthur Fellows (22 percent) were born outside of the United States.⁴⁰ The top five countries of birth for foreign-born MacArthur fellowship winners are the United Kingdom (27), China (17), Canada (16), Germany (14), and India (10) (Figure 5). In 2019, six of the 26 MacArthur Fellows are foreign born, and two of them, Ocean Vuong and Valeria Luiseli, are currently writing about Vietnamese and Central American immigration, respectively.⁴¹

Figure 5. Foreign-Born MacArthur Fellows by Country of Birth, 1981-2019



Source: IIR Analysis of MacArthur Fellows Location at Birth. Accessed November 10, 2019. <https://www.macfound.org/maps/1/>

The Rhodes Scholars program is one of the oldest and most prestigious international scholarships awarded to individuals from many countries to study at the University of Oxford in the United Kingdom.⁴² Each year, 32 students from the United States are selected.⁴³ In 2019, nearly half of the recipients were immigrants or children of immigrants, including the first Rhodes Scholar who is a beneficiary of the Deferred Action for Childhood Arrivals (DACA) initiative. About half of the Rhodes Scholars for 2020 are first-generation Americans.⁴⁴

Recent studies also suggest that children of immigrants have higher academic achievement in certain key STEM competitions than their native-born peers.⁴⁵ One study by the National Foundation for American Policy found that 83 percent of finalists for the 2016 Intel Science Talent Search were the children of immigrants.⁴⁶ This same study found that former H-1B visa holders, who represented less than one percent of the U.S. population, were four times more likely to have a child as a finalist in this same competition.⁴⁷

These talented young people may go on to do great things in science. For example, at least one recent U.S. Nobel Laureate was the child of immigrants. Arthur Ashkin, winner of the 2018 Physics Nobel Prize, is the son of immigrant Jewish parents Isadore and Alana Ashkin.⁴⁸



“Science is a unique activity, it brings people from around the world together.”

Peter Agre, Nobel Prize for Chemistry 2017

Conclusion

Immigrants to the United States and their children continue to excel, particularly in research and science. Furthermore, U.S. institutions of higher education attract top scholars from around the world and allow them to pursue their scientific endeavors. Often, scientific discovery is a result of international collaboration, either taking place across national boundaries or among people from a variety of countries working together in the United States.

In 2019, there are eight U.S. Nobel Laureates, and four of them were born outside of the United States but immigrated to the United States at some point in their lives to realize their dreams. Since 1901, 15.1 percent of all Nobel Laureates have been immigrants in the United States. Moreover, three of this year's Nobel Laureates from a country other than the United States have been associated with a U.S. institution of higher education at some point in their lives, meaning that even if they do not move to the United States permanently, U.S. universities have played a key role in their formation.

Immigrants' success is not limited to the Nobel Prize. This year, six out of 26 MacArthur Fellows were foreign born. Since 1981, 226 MacArthur Fellows were immigrants. Additionally, in each of the last two years, roughly half of the Rhodes Scholars have been immigrants or children of immigrants.

Scientific discovery does not stop at the border, and the ability to transcend national boundaries is critical for the world's scientists and scholars. However, recent policy changes may limit the ability of scholars to study and work in the United States. For example, the travel ban keeps scholars from certain countries from entering the United States, large backlogs in the family- and employment-based immigration systems mean many people must endure years of waiting for a green card, and temporary visas for highly skilled workers have become more difficult to obtain. Notably, foreign student enrollment in U.S. universities has already decreased 10 percent since 2015 while international enrollment in Australia and Canada has risen.⁴⁹

These changes threaten to negatively impact foreign scholars' ability to conduct research in the United States and collaborate internationally, while limiting U.S. scholars' ability to collaborate with top international science talent. The United States takes great pride in our immigrant Nobel Laureates, MacArthur Fellows, and Rhodes Scholars. They contribute to the world's knowledge, and therefore to the economy. Policymakers must consider the impact of changes to the immigration system on scientific discovery and international collaboration.

About the Authors

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About the Institute for Immigration Research

The Institute for Immigration Research (IIR) is a multidisciplinary research institute at George Mason University. The IIR is dedicated to informing and refocusing the immigration conversation among academics, policymakers, and the public by producing and disseminating valid, reliable, and objective multidisciplinary academic research related to immigrants and immigration to the United States. Our faculty affiliates, graduate students, and partners are at the forefront of research examining the economic contributions of all immigrant in the United States, with an emphasis on immigrant entrepreneurs with high levels of education and skills. The IIR produces high quality, timely research and analysis intended to promote informed action.

The IIR was founded in 2012 through the generous donation of Ms. Diane Portnoy, educator and philanthropist and is a joint venture with The Immigrant Learning Center, Inc. (ILC) of Malden, Massachusetts.

The IIR is located on the campus of George Mason University in Fairfax, Virginia, outside the nation's capital, Washington, DC. Its strategic location allows the IIR to draw on unparalleled academic, government, and private resources to advance its mission in research, education, and professional opportunities for current and future scholars of immigration studies. Through conferences, workshops, lectures, and other events, the IIR is able to engage in community outreach with one of the most diverse populations in the United States.

Endnotes

- ¹ The Royal Swedish Academy of Sciences. 2019. "Press Release on The Prize in Economic Sciences 2019." Stockholm: The Royal Swedish Academy of Sciences. Retrieved October 17, 2019 (<https://www.nobelprize.org/prizes/economic-sciences/>).
- ² The total percentage of Laureates here excludes 24 Nobel Peace Prizes between 1901 and 2019 which were given to organizations, not individuals.
- ³ Stein, Jeff. 2019 "Three Share Nobel Prize in Economics for Experimental Approach to Solving Poverty." *The Washington Post*. Accessed on October 15, 2019 (<https://www.washingtonpost.com/business/2019/10/14/economists-share-nobel-prize-experimental-approach-solving-poverty/>).
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- ⁵ Anderson, Stuart. 2019. "Immigrants and Nobel Prizes: 1901-2019." National Foundation for American Policy. NFAP Policy Brief, October 2019. Accessed on October 20, 2019 (<https://nfap.com/wp-content/uploads/2019/10/Immigrants-and-Nobel-Prizes.NFAP-Policy-Brief.October-2019.pdf>).
- ⁶ In 2018 the Nobel Prize for Literature was postponed. The winner, Olga Tokarczuk, was announced in 2019. She is foreign and was added to the foreign winners count for 2018.
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¹⁸ The Royal Swedish Academy of Sciences. 2019. "Facts on Nobel Prizes." Stockholm: The Royal Swedish Academy of Sciences. Retrieved October 17, 2019 (<https://www.nobelprize.org/prizes/facts/nobel-prize-facts>).

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²⁰ Massachusetts Institute of Technology. 2019. "People: Abhijit Banerjee." Massachusetts Institute of Technology, Department of Economics. Accessed on October 17, 2019 (<https://economics.mit.edu/faculty/banerjee/short>).

²¹ Ibid.

²² The Royal Swedish Academy of Sciences. 2019. "Press Release on The Prize in Economic Sciences 2019."

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²⁴ Nazar, Kevin, Michele Waslin and James C. Witte, 2018. "The 2018 Nobel Laureates and Foreign-Born Scholars in the U.S. Higher Education System." Institute for Immigration Research. December 2018. Retrieved on December 12, 2018 (https://d101vc9winf8ln.cloudfront.net/documents/29731/original/Nobel_Prize_Paper_2018_FINAL_120718.pdf?1544369333).

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²⁶ Aggarwal-Schifellite, Manisha. 2019. "Michael Kremer wins Nobel in Economics." *The Harvard Gazette*. October 14, 2019. Retrieved November 17, 2019 (<https://news.harvard.edu/gazette/story/2019/10/harvards-michael-kremer-recognized-with-nobel-in-economics/>).

²⁷ Ibid.

²⁸ Banerjee, Abhijit, Esther Duflo, Michael Kremer. 2016. "The Influence of Randomized Controlled Trials on Development Economics Research and on Development Policy." *The State of Economics, The State of the World*. Retrieved on November 22, 2019 (<https://www.povertyactionlab.org/sites/default/files/publications/the-influence-of-rcts-on-developmental-economics-research-and-development-policy.pdf>); Duflo, Esther, Michael Kremer, Jonathan Robinson. 2008. "How High are Rates of Return to Fertilizer Evidence from Field Experiments in Kenya." *American Economic Review*. 98(2) 482-488. Retrieved on November 22, 2019 (<https://pubs.aeaweb.org/doi/pdf/10.1257/aer.98.2.482>).

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³¹ Ibid.

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