



# IMMIGRATION, INNOVATION & U.S. ECONOMIC SECURITY

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## CHINESE IMMIGRANTS & THE FIRST U.S. TRANSCONTINENTAL RAILROAD (1863-69)

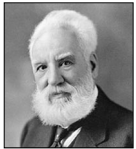


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## IMMIGRANTS & INNOVATION



**ELEUTHERE IRENEE DU PONT (1772-1834) (France)**  
Chemical industrialist, producer of gun powder  
Founder of E.I. Du Pont de Nemours & Co.



**ALEXANDER GRAHAM BELL (1847 - 1923) (Scotland)**  
– Inventor of telephone  
– Founder of the original Bell Telephone Co.



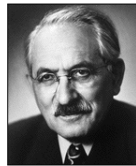
**CHARLES P. STEINMETZ (1865-1923) (Germany)**  
– Chief engineer, General Electric Co.  
– Theorist for alternating current electric power



## IMMIGRANTS & INNOVATION



**NIKOLA TESLA (1856 – 1943) (Serbia)**  
– Physicist, electrical engineer at Edison Co. who developed rotating magnetic field principle, AC induction motor, many ideas on electromagnetism  
– Licensed his AC patents to Westinghouse in 1888 that eventually led to AC electrical system in U.S.



**SELMAN A. WAKSMAN (1888 - 1973) (Russia)**  
– Pioneer in field of antibiotics (streptomycin, actinomycin, clavacin, neomycin and others)  
– Microbiologist at Rutgers University; awarded Nobel Prize in Medicine (1952)



**AN WANG (1920- 1990) (China)**  
– Developer of ferrite core memory, other computer technologies  
– Founder of Wang Laboratories



## IMMIGRANTS & INNOVATION



**IGOR SIKORSKY (1889-1972) (Russia)**

- Designer of first four-engine airplane, modern helicopter
- Founded Sikorsky Aircraft Corporation (now part of UTC)



**TSU WONG (1893-1965) (China)**

- 1916 engineering graduate of MIT
- Hired as Boeing's first Chief Engineer; designed its first Model C training seaplane sold to U.S. Navy



**CHARLES K. GAO (1933 – 2018) (China)**

- Ph.D. in electrical engineering at University College, London
- "Godfather" of fiber optics, fiber optic telecommunications
- Awarded 2009 Nobel Prize in Physics



## IMMIGRANTS & INNOVATION



**ANDREW S. GROVE (1936 - 2016) (Hungary)**

- Developer of basic semiconductor technologies
- Co-founder of Intel Corporation



**JERRY YANG (1968 - ) (Taiwan)**

- Co-founded Yahoo! Internet search engine company in 1994 while in his Ph.D. studies at Stanford University
- Led Yahoo's historic U.S.\$1 billion (40%) investment in Alibaba, China's largest and most successful private firm



**SERGEY BRIN (1973 - ) (Russia)**

- Co-founded Google Internet search company in 1998-99 while in his Ph.D. studies at Stanford University
- Now president of Alphabet with personal net worth of some U.S.\$40 billion



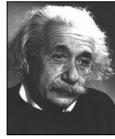
## IMMIGRANTS AND ATOMIC ENERGY



Hans Bethe



Felix Bloch



Albert Einstein



Enrico Fermi



Otto Frisch



George Kistiakowsky



Leo Szilard



Edward Teller



Theodore  
von Kármán



John  
von Neumann



Eugene Wigner



Chien-Shiung  
Wu



## IMMIGRANTS AND MISSILE TECHNOLOGY

### Operation Paperclip

Ft. Bliss, TX, & White Sands Prvg. Grounds, NM (1945-50)  
Redstone Arsenal, Huntsville, AL (1950- 59)

Dr. Wernher von Braun and, eventually, some  
1,600 other German scientists, engineers



## IMMIGRANTS & ENTREPRENEURSHIP

- June 2011 study by Partnership for New American Economy entitled *The “New American” Fortune 500*:
  - More than **40%** of 2010 Fortune 500 companies founded by immigrants or children of immigrants
  - Almost **20%** of newest Fortune 500 companies (i.e., founded since 1985) founded by an immigrant
  - Fortune 500 companies founded by immigrants or children of immigrants employ **> 10 million workers worldwide**, with those founded by immigrants employing **3.6 million**
  - Fortune 500 companies founded by immigrants or children of immigrants had combined revenues of **U.S.\$4.2 trillion**, which is more than GDP of every country in world except U.S., China and Japan
  - Familiar corporate names: AT&T, Boeing, Ford, GE, Google, Heinz, Hertz, Home Depot, Kraft, Mattel, McDonald’s, P&G



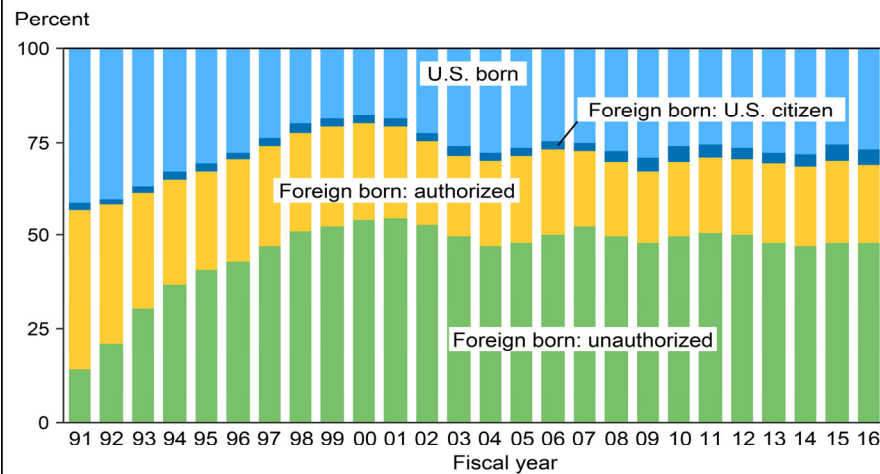
## IMMIGRANTS & INTELLECTUAL PROPERTY

- June 2012 study by Partnership for New American Economy entitled *Patent Pending: How Immigrants are Reinventing America*:
  - **76%** of 1,466 patents issued in 2011 to top 10 U.S. research universities (ranked by patent activity) had at least one foreign born inventor (faculty member, staff or student)
  - Foreign born inventors involved in **87%** of semiconductor manufacturing, **84%** of information technology, **83%** of pulse or digital communications, **79%** of pharmaceutical and drug and **77%** of optics inventions covered by issued patents
  - Foreign born inventors within 1,466 issued U.S. patents came from **88** different countries around the world
  - 10 universities surveyed in PNEA study: California\*, Stanford, MIT, Wisconsin (Madison campus), Texas\*, Cal Tech, Illinois\*, Michigan\*, Cornell, Georgia Tech

\* State university system as a whole



### Legal status of hired crop farmworkers, fiscal 1991-2016



Note: Values for each year are 3-year moving averages to smooth fluctuations due to small sample sizes: e.g. data reported for fiscal 2016 are the average over fiscal 2014-16. U.S. born includes those born in Puerto Rico.  
Source: USDA Economic Research Service using U.S. Department of Labor, National Agricultural Workers Survey.



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## IMMIGRANTS & NOBEL PRIZES

- Between 2000 - 2021, Americans won 104 Nobel Prizes in physics, chemistry or medicine, and 38% of those U.S. winners were immigrants:
  - 16 of 36 in physics (44%)
  - 13 of 35 in chemistry (37%)
  - 11 of 33 in medicine (33%)
- Between 1901 – 2021, Americans won a total of 109 of 311 Nobel Prizes in physics, chemistry or medicine, and 35% of those U.S. winners were immigrants
- In 2016, Americans won six science or economics Nobel Prizes, ALL SIX of whom were immigrants
- In 2021, three of the four U.S. Nobel Prize winners in physics, chemistry and medicine were immigrants.

Source: National Foundation for American Policy (October 2021)



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## IMMIGRANT EXECUTIVE LEADERSHIP



**SATYA NADELLA:** CEO, Microsoft

MS, Univ. of Wisconsin; MBA, Univ. of Chicago

*Time* 100, 2018; *Financial Times* Person of Year, 2019



**LISA SU:** CEO, Advanced Micro Devices

BS, PhD, Massachusetts Institute of Technology

SIA Robert N. Noyce award, 2020



**JENSEN HUANG:** CEO, Nvidia

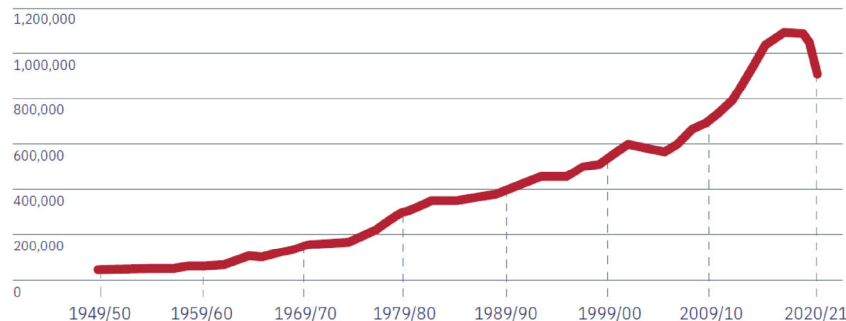
BS, Oregon State Univ.; MS, Stanford Univ.

SIA Robert N. Noyce award, 2021



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### INTERNATIONAL STUDENTS, 1949/50–2020/21



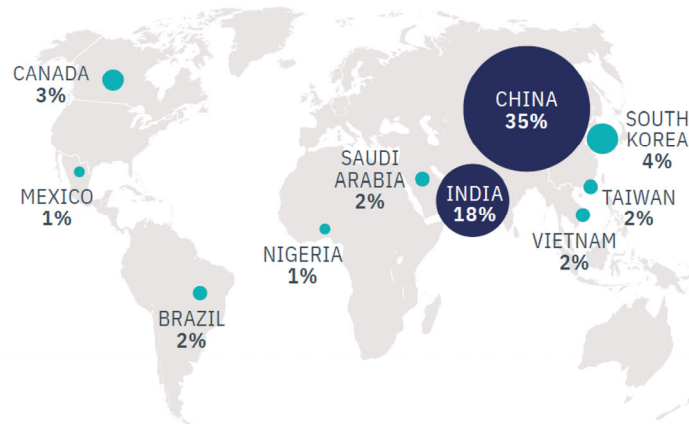
In 2020/21, the total number of international students **declined by 15%** from the prior academic year. This decrease was primarily due to the effects of the COVID-19 pandemic.

**Source:** Institute of International Education, Open Doors Data





## LEADING PLACES OF ORIGIN OF INTERNATIONAL STUDENTS, 2020/21



Students from China and India accounted for **53%** of international students.

**Source:** Institute of International Education, Open Doors Data



## IMMIGRANTS & U.S. MILITARY: 442<sup>nd</sup> REGIMENTAL COMBAT TEAM

Comprised almost entirely of some 14,000 2<sup>nd</sup> generation Japanese Americans (Nisei), many who volunteered from U.S. internment camps while their families remained confined under Executive Order 9066

Intense combat duty in 1944-46 in Italy, France and Germany

Most decorated combat unit of its size in U.S. Army history with >18,000 awards earned in 2 years, including >4,000 Purple Hearts, 4,000 Bronze Stars, 588 Silver Stars, 21 Medals of Honor, 8 Presidential Unit Citations

442nd RCT suffered 650 KIA, 67 MIA and >3,700 WIA in five campaigns



E Company, 2<sup>nd</sup> Battalion, 442<sup>nd</sup> Regimental Combat Team  
Camp Shelby, Mississippi, May 1943



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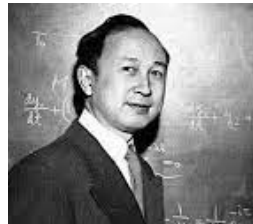
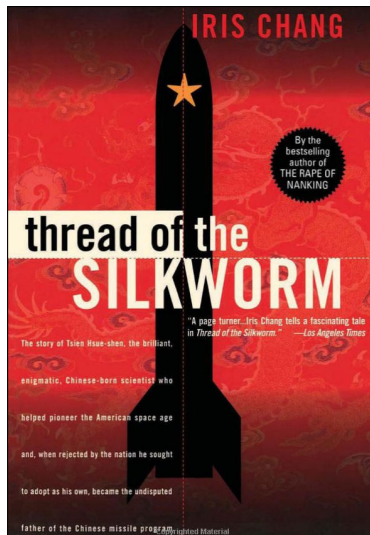


## IMMIGRANTS & U.S. MILITARY: CHINESE AMERICANS IN WORLD WAR II

- In 1941, only about 78,000 Chinese American men and women lived in mainland United States with another 29,000 in then-territory of Hawaii
  - About 40% of those Chinese Americans who served were still legally ineligible for U.S. citizenship
- About 20,000 Chinese American men & women served in uniform in all branches of the U.S. Armed Forces during World War II
- Unusually for the time, most Chinese Americans were not required to serve in racially segregated units
- About 25% of all Chinese American men in uniform served in 14<sup>th</sup> Air Service Group, U.S. AAF, a/k/a “Flying Tigers,” in China-Burma-India theater



Allan Fay Wong  
Military Intelligence Service  
U.S. Army, 1943-46



Tsien Hsue-Shen

钱学森

Qian Xuesen

錢學森

- Brilliant mathematician, physicist and aerospace engineer who studied at MIT and Caltech (Ph.D., 1936)
- Worked on Manhattan Project; sent as U.S. Army colonel to Germany to help pick top German rocket scientists for U.S.
- Returning after the war to work again at Caltech, helped to found its famous Jet Propulsion Laboratory (JPL)
- Was stripped of his security clearance as suspected Communist in 1950; then held under FBI house arrest for five years
- Finally freed, returned to China in 1955 to help lead both its successful atomic bomb and ballistic missile programs

## GROWING U.S. POLITICAL CONSENSUS ABOUT MAIN FOREIGN THREATS

- Unusual agreement between Congress and White House about greatest foreign threats to U.S. national and economic security: China and Russia
- Recent high profile visits to Taiwan by Speaker Nancy Pelosi and other senior leadership in U.S. Congress
  - New U.S. \$1.1 billion defense armaments sale to Taiwan
  - President Biden's statements on defense of Taiwan if invaded
- More U.S. export controls, sanctions, other measures to limit economic, technological links with China, Russia
  - Foreign Investment Risk Review Modernization Act (FIRRMA)
  - Barring U.S. exports to enablers of human rights abuses
  - CHIPS & Science Act limits on U.S. semiconductor technology exports, expansion of semiconductor production in China
  - More Chinese, Russian firms, universities, institutes barred from receiving exports of U.S. technology
  - More federal criminal investigations and prosecutions



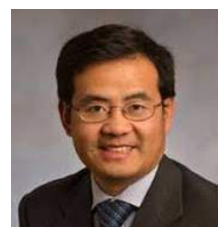
## FAILED FEDERAL PROSECUTIONS



**Xiaoxing Xi, Ph.D.**  
Physics Dept.  
Temple University



**Gang Chen, Ph.D.**  
Mech. Eng. Dept.  
MIT



**Anming Hu, Ph.D.**  
Mech., Aero. &  
Biomed. Eng. Dept.  
Univ. of Tennessee

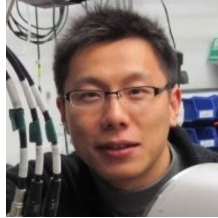


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## SUCCESSFUL FEDERAL PROSECUTIONS



**Dongfeng Chen**  
Boeing  
California



**Hongjin Tan**  
Phillips 66  
Oklahoma



**Yi-Chi Shih**  
Elec. Eng. &  
Comp. Sci. Dept.  
UCLA  
California



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## ASIAN AMERICAN SCHOLAR FORUM SEPTEMBER 2022 STUDY

- AASF is New York-based nonprofit group of U.S. academic scholars who are of Asian descent and support belonging, openness, freedom and equality
- Published September 2022 report by three scholars at Princeton, Harvard and MIT to “estimate trends in migration of Chinese-origin scientists to China using bibliometric data”
  - Data on both junior, senior scientists in life science, physical science & mathematics, engineering & computer science
  - Found increasing numbers of both junior and senior scientists were voluntarily leaving U.S. institutions and moving to Chinese institutions based on disclosed employment affiliations in their published academic journal papers
  - Identified both Chinese “pull” and U.S. “push” factors causing such moves by such scientists
- Full AASF report at: <https://arxiv.org/abs/2209.10642>



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## REFLECTIONS FROM U.S. HISTORY

- Much of American history scarred by racism, nativism and xenophobic fears about “foreigners,” especially those who are visibly non-northern European in origin
- Despite those negative factors, immigration has also fueled U.S. technological and economic success, both in war and in peace, since 1776 and has improved life for all Americans
- Today, with only about 5% of world’s population but with almost 30% of world’s wealth and with its native population growth dropping in 21<sup>st</sup> century, U.S. can only maintain its high standard of living through continued immigration:
  - In science and technology for our national security
  - In industry and commerce for our economic strength
  - In agriculture for our stable, secure domestic food supply
- Chinese American scientists, engineers have made – and will continue to make – many outstanding contributions to U.S. technology and innovation across many different fields

## A CLOSING COMMENT

- However, as U.S. and China may diverge more economically and technologically in next few years, Chinese American scientists and engineers likely to feel more personal and professional effects
  - U.S. Government will continue to investigate, prosecute suspected criminal activity for economic espionage, illegal exports, disclosure failures and other such federal violations that appear to benefit Chinese government, companies or universities
  - Increasing need to be aware of how some activities can be potentially misunderstood or misinterpreted by government officials in both countries in light of such tensions and suspicions
  - More important than ever before for Chinese American scientists and engineers to comply with applicable laws that regulate flows of data and technology from U.S. to China and from China to U.S.
  - Individual criminal convictions or guilty pleas may fuel more negative generalized perceptions and fears in government and in general public about “*insider threats*” in both countries

**THANK YOU!**

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