

# **FLOWS OF STUDENTS, COMPUTER WORKERS, & ENTREPRENEURS**

September 23, 2014

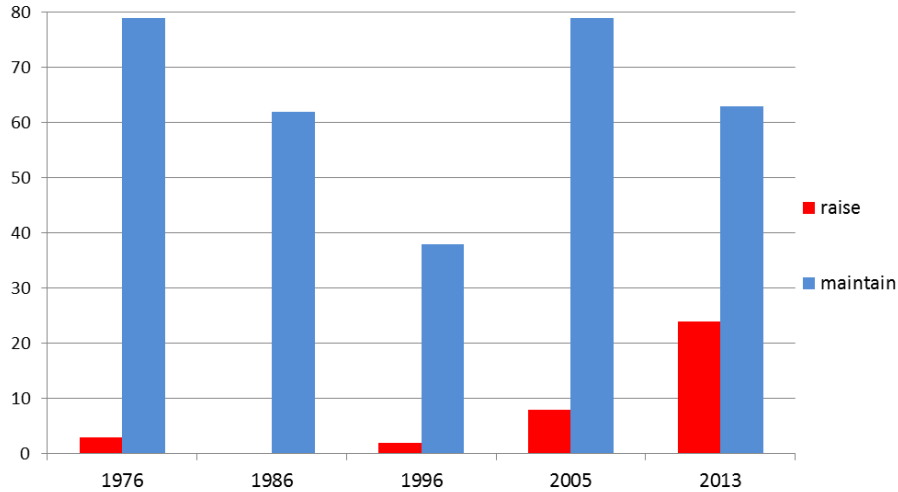
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Presentation to HIGH-SKILLED IMMIGRATION POLICY & THE  
GLOBAL COMPETITION FOR TALENT, National Academies of  
Science, Washington, D.C.

# Competitive Policies

- Other receiving nations are competing for highly skilled workers, but
  - large competitors like the UK are scaling down, so too is Singapore;
  - Competitive policies in Sweden or Norway pull in small numbers but may attract the best qualified
- Admission policies have many components;
  - USA does not have the most competitive visa regime, but it does exert the greatest attraction

### Percent of more developed nations reporting changes to immigration policy

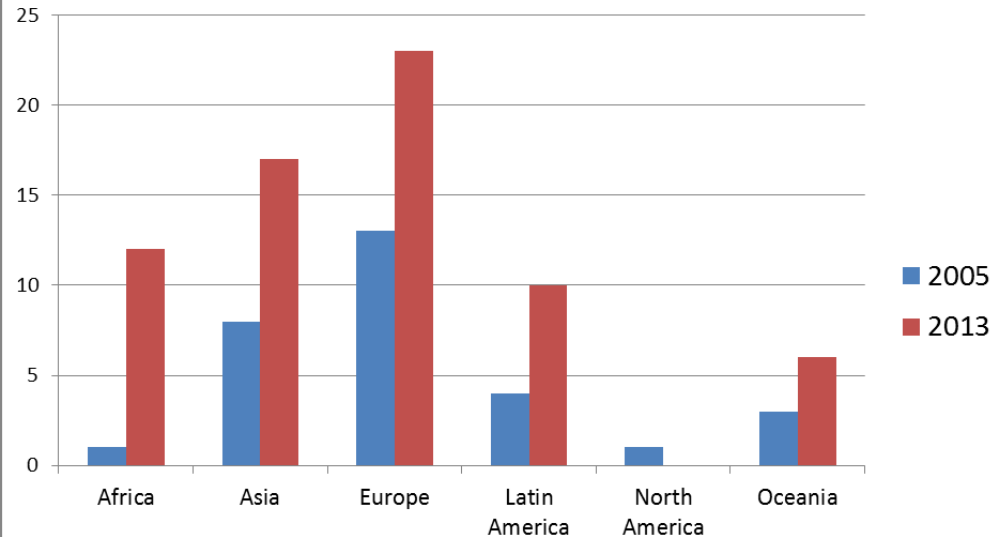


UN World Population Policies, 2013.

25% of nations now intend to raise overall immigration

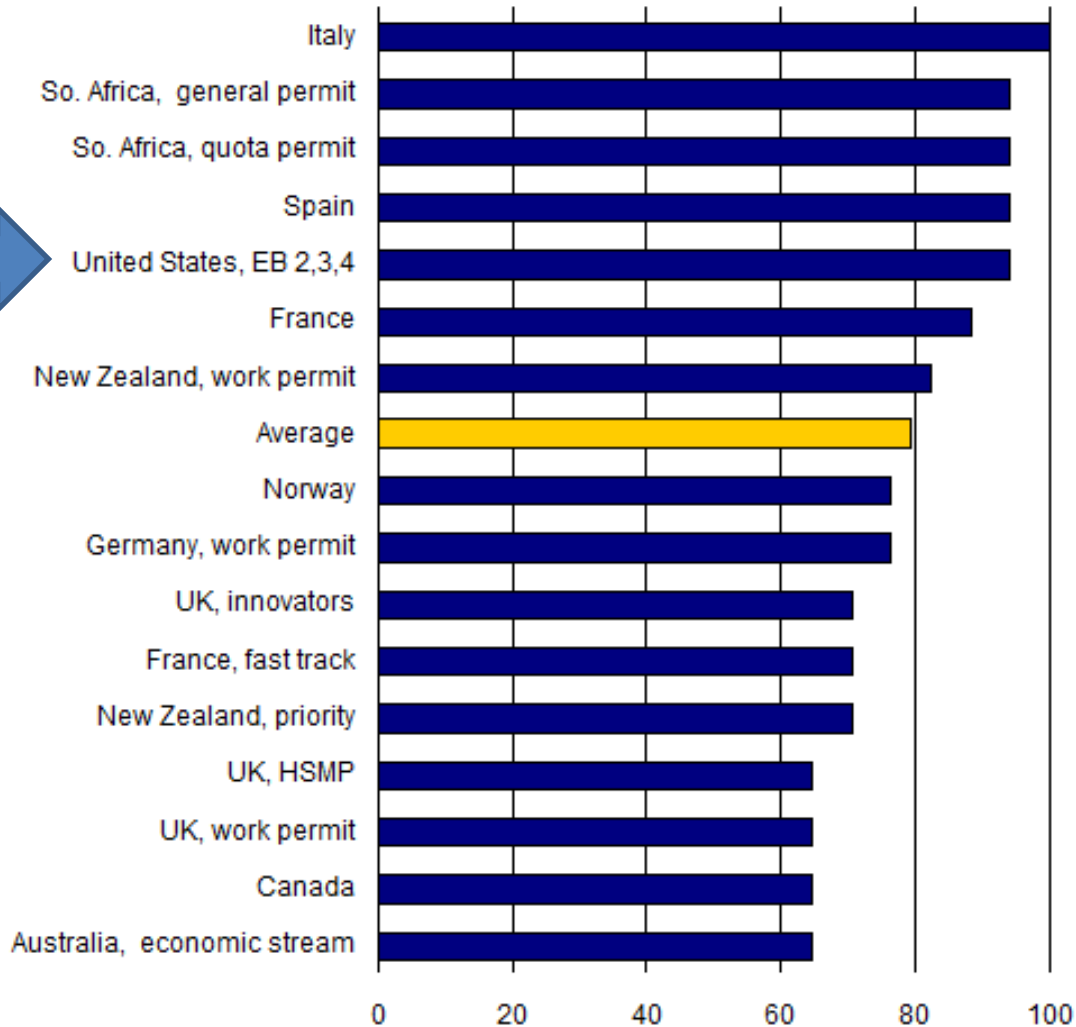
More European nations intend to raise highly skilled immigration, just less than 25% of them

### Percent of nations reporting policy to raise highly skilled immigration



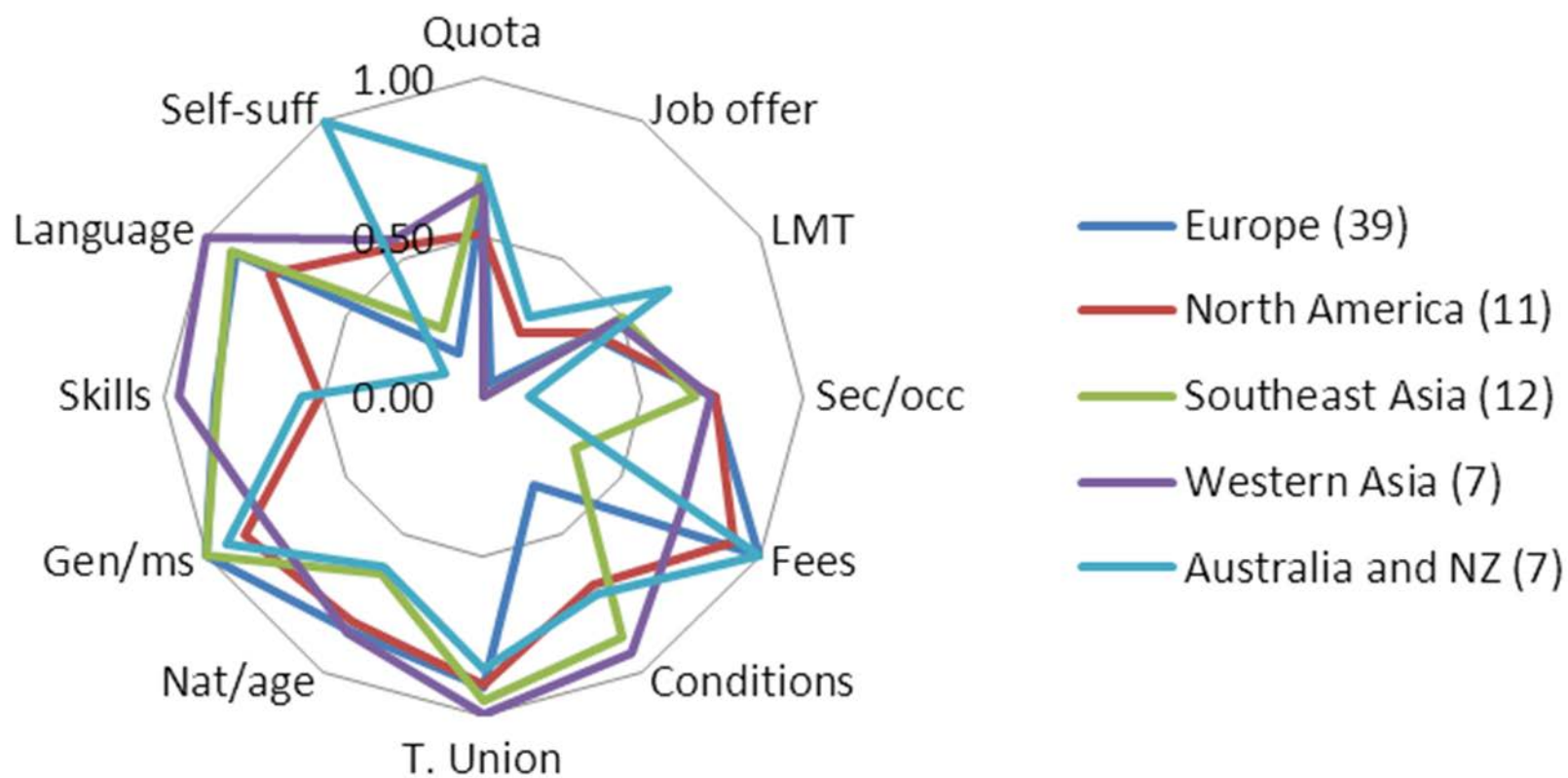
UN World Population Policies 2013

Figure 3. Ranking of the Index of Controlled/Competitive Permanent Skilled Worker Programs



Source: see text

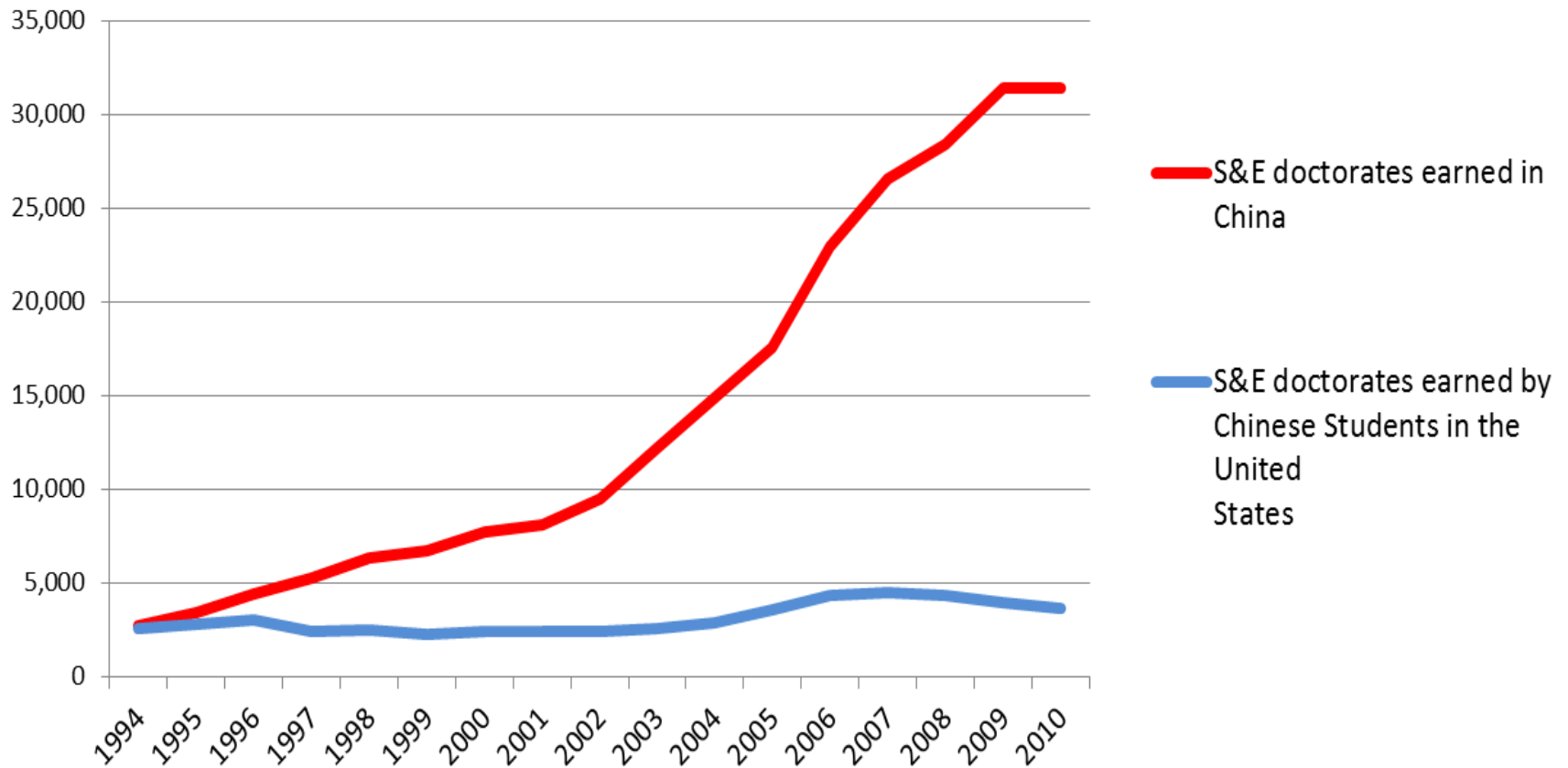
**Fig. 4.2 Openness indicators by selected regions, 2009**



# International student enrollments are significantly increased

- China and India have a boom in STEM graduates, quality is an issue
- USA share of international students down, but the number of enrollees is strongly up
- The current and future potential supply of highly skilled workers is huge

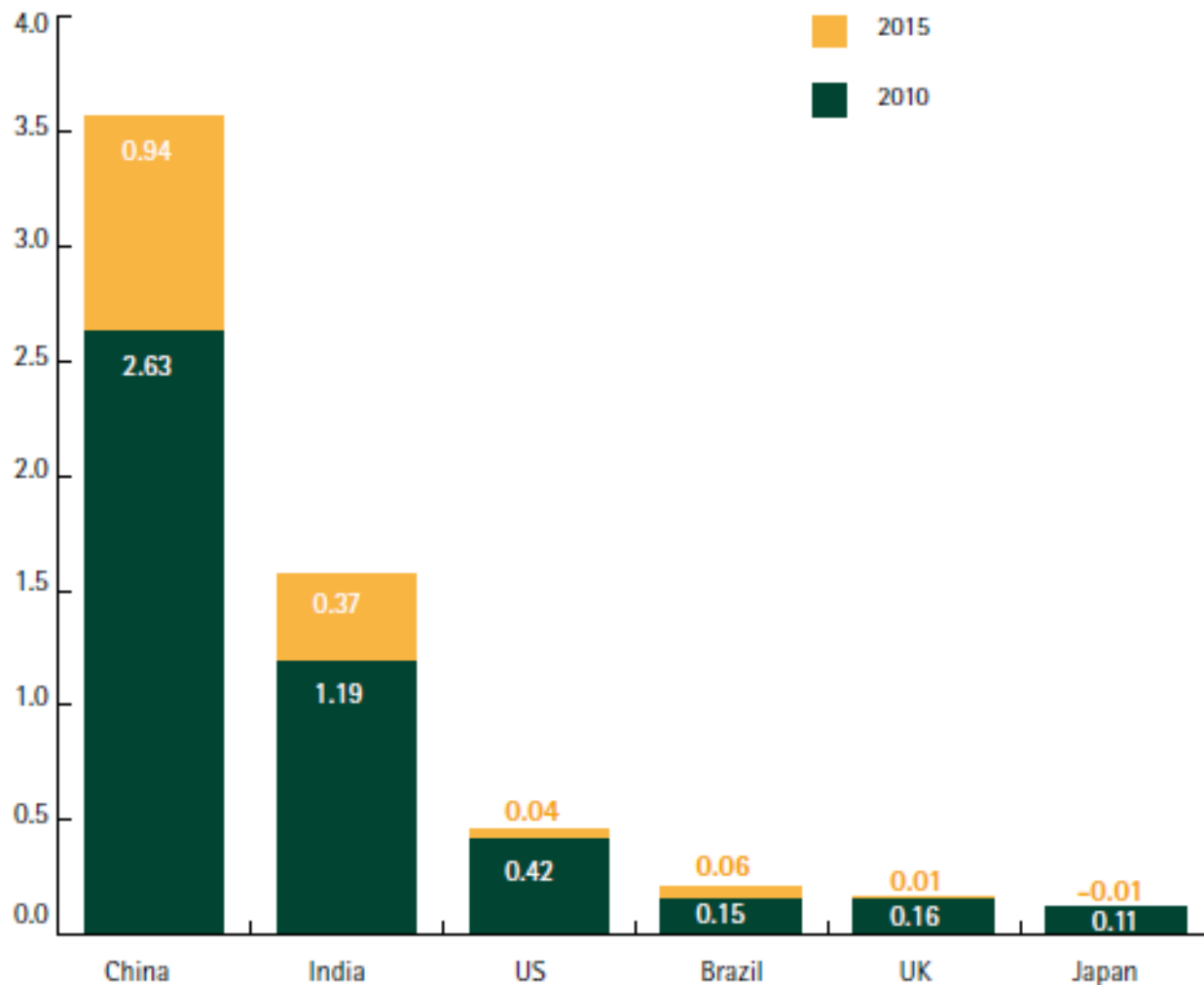
## S&E PhD degrees earned by Chinese students



Source: NSF, S&E Indicators 2014

**Figure 4: Technical/associate, graduate, post-graduate and doctoral STEM degrees (in millions), 2010 and 2015**

China and India lead the way.



Source: Accenture Institute for High Performance analysis



# Analysis of student “F” visas from 130 countries 1999-2003 found:

- increased enrollments in source countries increase US visas
- students enrolled in competitor nations US visas (ACUN & FGJ)
- “policy” effects are small (RR, visa rejection rates) compared to economic & enrollment variables (Lowell & Khadka 2010)

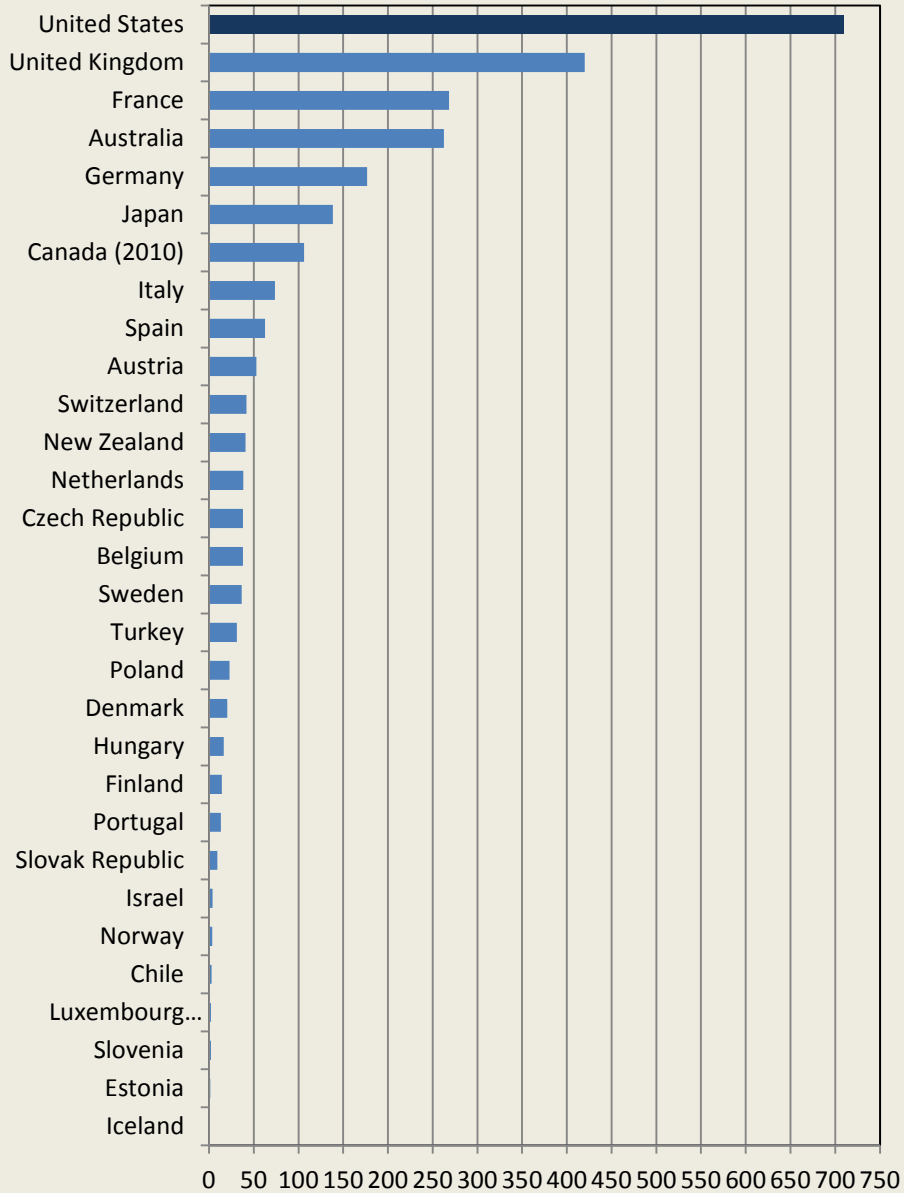
**Table 1. Fixed Effects Regression Results: The Natural Log of Foreign Student Visas**

	1	2	3	4
<b>Regressors:</b>				
<i>logGDPPC<sub>j,t-1</sub></i>	0.055 (0.18)	0.469 (1.61)	1.206 (2.86)	1.278 (3.13)
<i>logER<sub>j,t-1</sub></i>	0.011 (0.06)	0.156 (0.88)	3.060 (3.77)	2.475 (3.07)
<i>logGDPPC<sub>j,t-1</sub>*logER_1<sub>j,t-1</sub></i>	--	--	-0.365 (-4.14)	-0.281 (-3.16)
<i>logPOP<sub>j,t-1</sub></i>	-1.731 (-1.51)	-0.805 (-0.71)	-2.567 (-2.40)	-1.622 (-1.48)
<i>logRR<sub>j,t-1</sub></i>	-0.239 (-4.94)	-0.176 (-3.72)	-0.185 (-3.81)	-0.147 (-3.02)
<i>logTC<sub>j,t-1</sub></i>	-0.287 (-2.19)	-0.150 (-1.35)	-0.299 (-2.62)	-0.185 (-1.83)
<i>logACUN<sub>j,t-1</sub></i>	-0.130 (-1.79)	-0.051 (-0.69)	-0.141 (-1.99)	-0.074 (-1.03)
<i>logFGJ<sub>j,t-1</sub></i>	-0.068 (-1.30)	-0.062 (-1.23)	-0.030 (-0.59)	-0.034 (-0.67)
post911	--	-0.227 (-5.90)	--	-0.184 (-4.83)
<i>constant</i>	18.70 (1.97)	16.54 (0.89)	41.02 (2.48)	23.54 (1.39)
#Obs.	506	506	506	506
R-sq: within	0.28	0.34	0.33	0.38
Overall	0.45	0.19	0.40	0.28

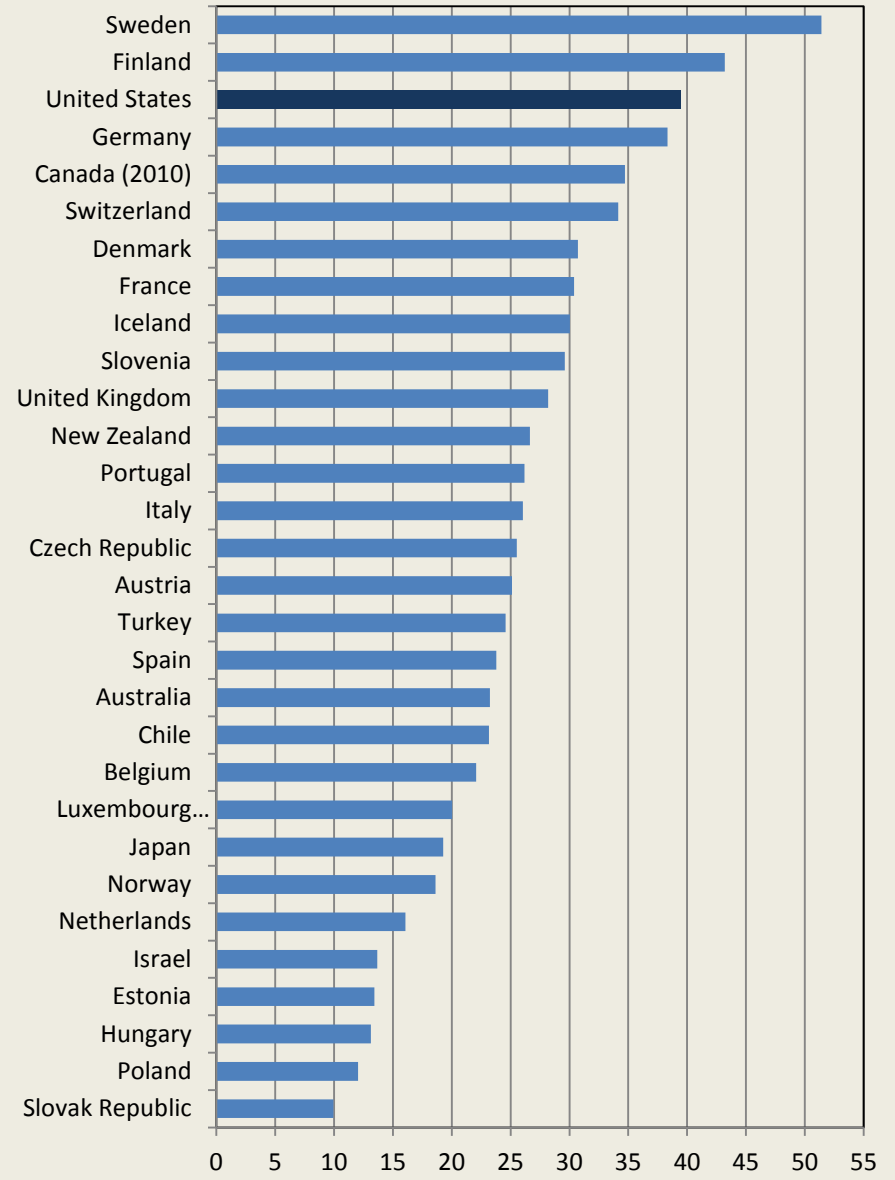
# Policies aside, US key destination

- The USA received 2/3<sup>rd</sup> of college educated immigrants in 1990 and 2000
- Data thru 2010 shows that the USA remains the central destination
- The USA will remain the leader in the competition for numbers over the near term

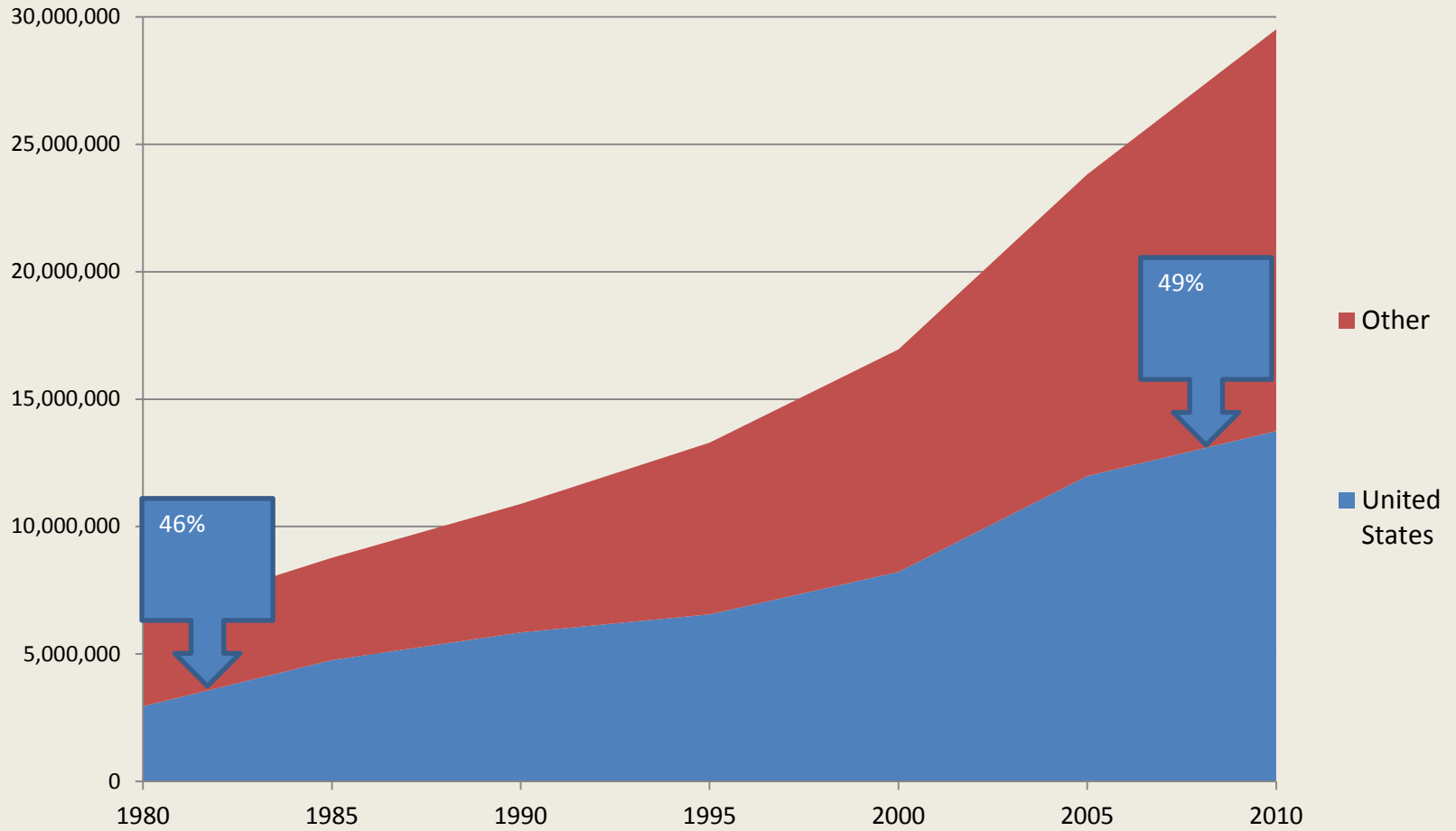
## International students 2011, 1000s



## International STEM enrollees, %

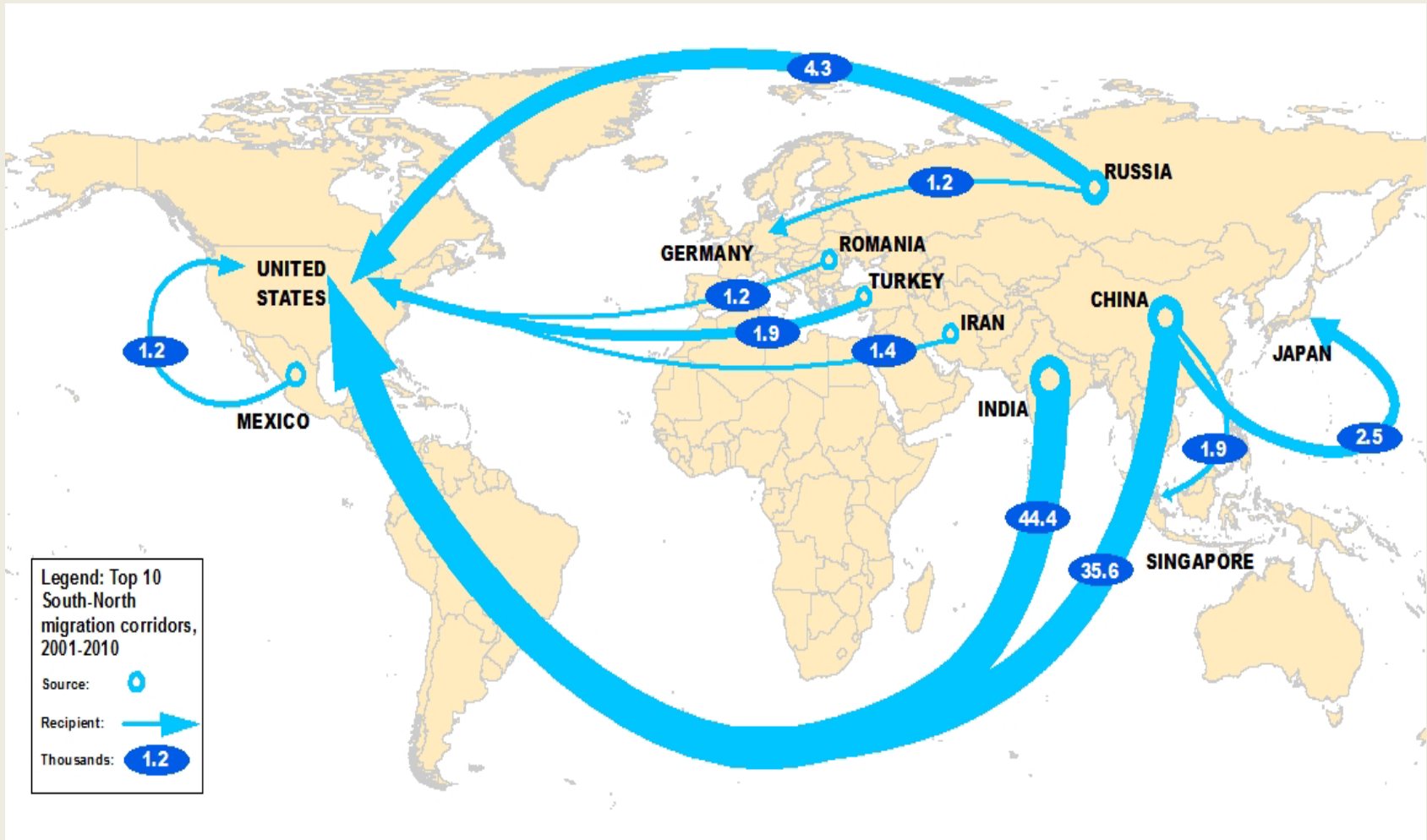


## High Skilled Foreign-Born Population, Leading 20 Nations of Destination



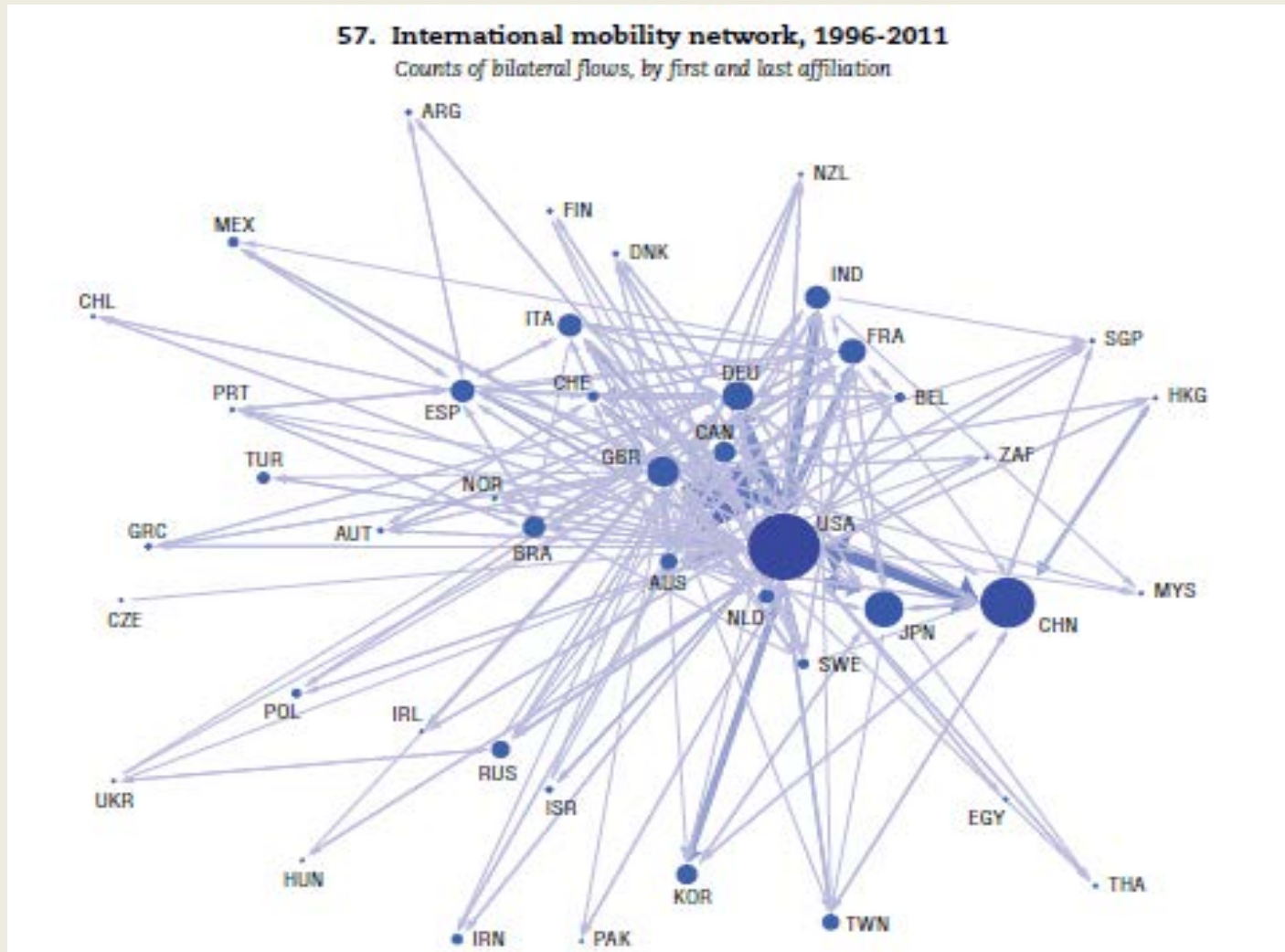
Source: IAB brain-drain data, <http://www.iab.de/en/daten/iab-brain-drain-data.aspx>

# Top-10 inventor South-North migration corridors, 2001-2010



Source: Committee on Development and Intellectual Property (CDIP), 2013. "Study on Intellectual Property and Brain Drain: A Mapping Exercise," World Intellectual Property Organization, [http://www.wipo.int/edocs/mdocs/mdocs/en/cdip\\_12/cdip\\_12\\_inf\\_4.pdf](http://www.wipo.int/edocs/mdocs/mdocs/en/cdip_12/cdip_12_inf_4.pdf)

# USA remains central in the international mobility of scientific authors

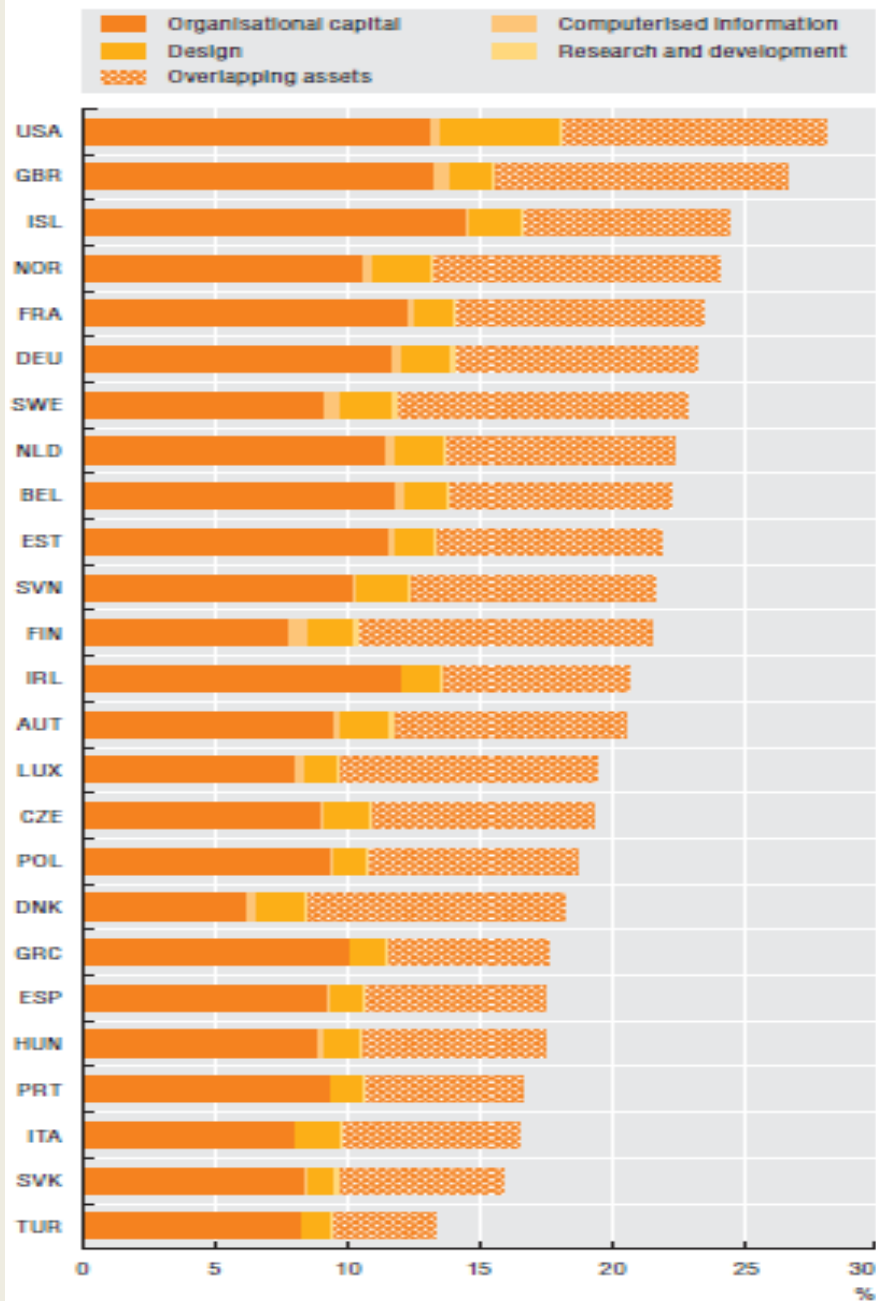


# S&E in major European countries growing, but not that fast

- The US is the leading employer of research S&E type workers
  - immigrants share in S&E jobs high in the USA
- Wage growth in major competitors – UK, Sweden, etc. – not as strong as in periphery

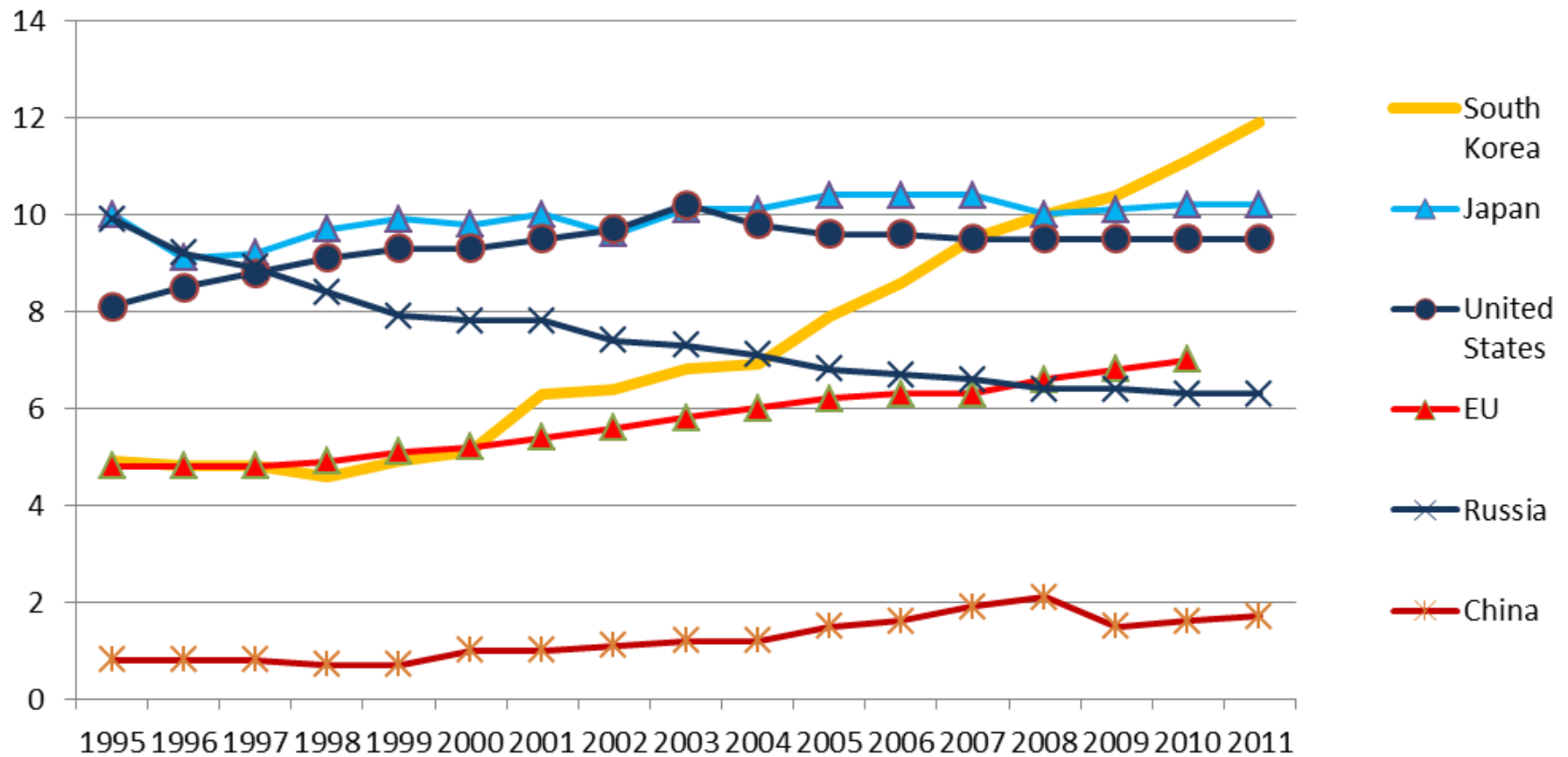
## Knowledge-based capital related workers, 2012

As a percentage of total employed persons



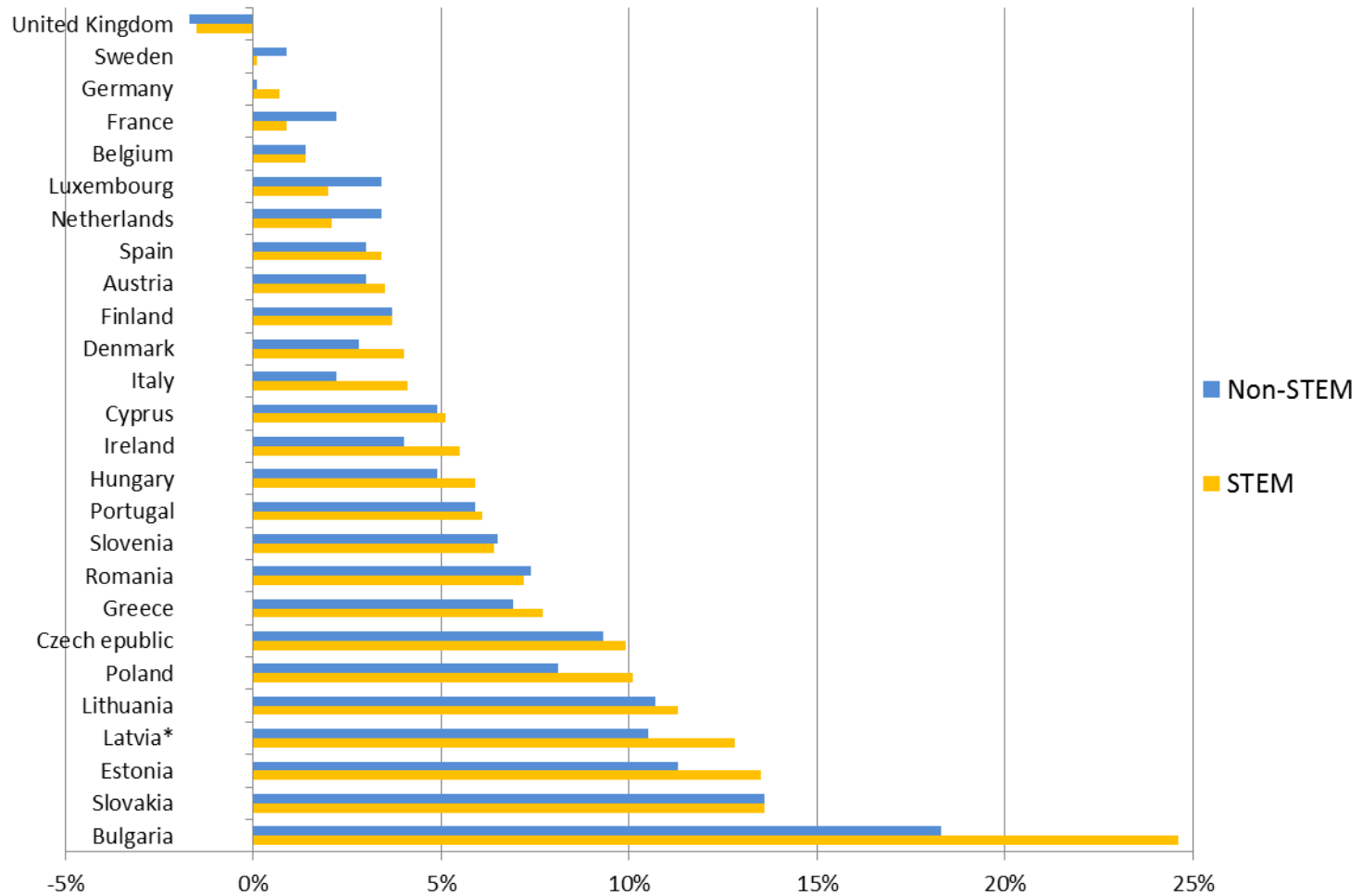


## Researchers as a share of total employment, %



NSF, S&E Indicators 2013

## Annual change in STEM earnings 2005 to 2010

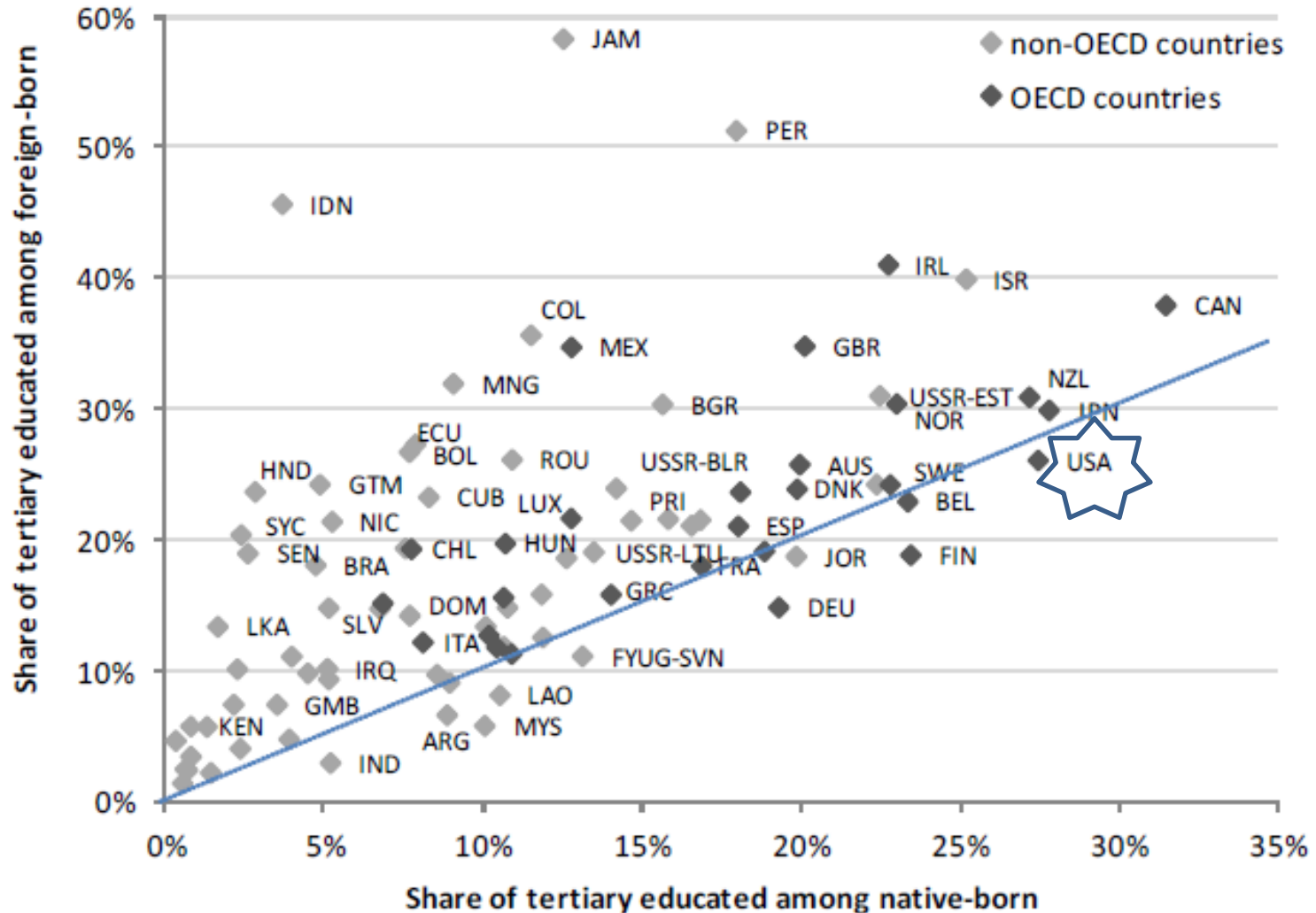


Goos, Maarten, Ian Hathaway, Jozef Konings, and Marieke Vandeweyer, 2013. High-Technology Employment in the European Union," VIVES Discussion Paper No. 41, <http://www.econ.kuleuven.be/VIVES/publicaties/discussionpapers/DP/dp2013/final-20131223-3rd.pdf>

# The USA is relatively attractive to highly skilled migrants

- The USA has a high share of college educated migrants, both overall and relative to natives
- The USA retains a high percentage of college educated migrants (they don't emigrate)
- Not all migrants are equally productive

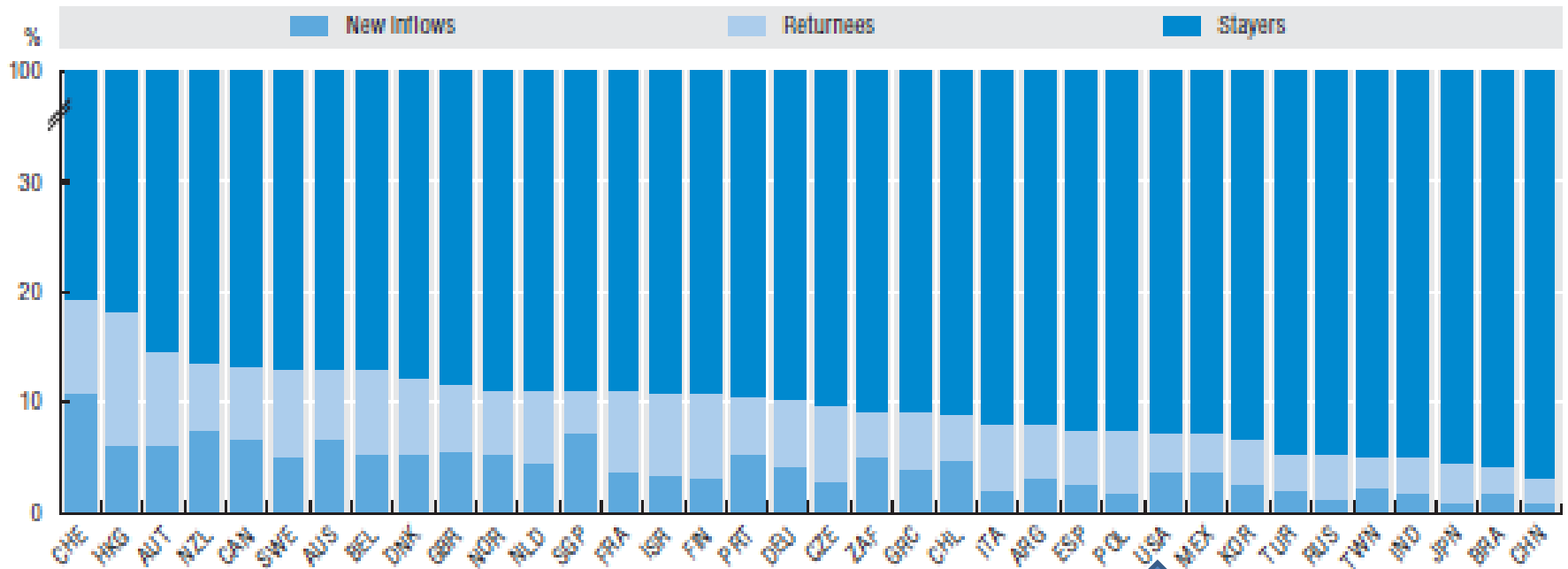
**Chart 3: Share of tertiary educated among native-born and foreign-born persons aged 15 and over by country of residence, circa 2000**



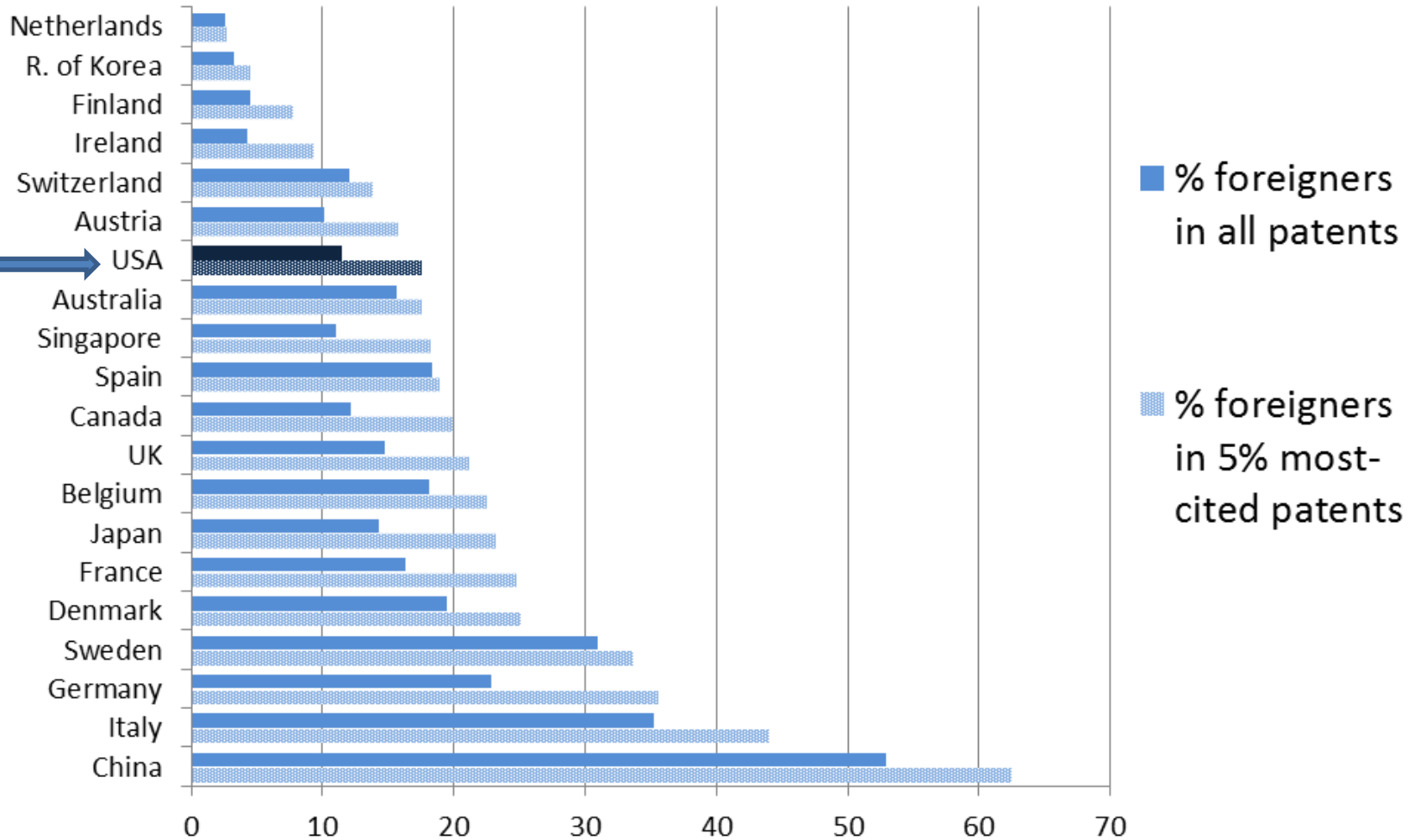
Source: DIOC-E 2000 (release 2.0)

## International mobility of scientific authors, 1996-2011

As a percentage of authors with two or more publications, by last reported affiliation



# Immigrants' share of patents



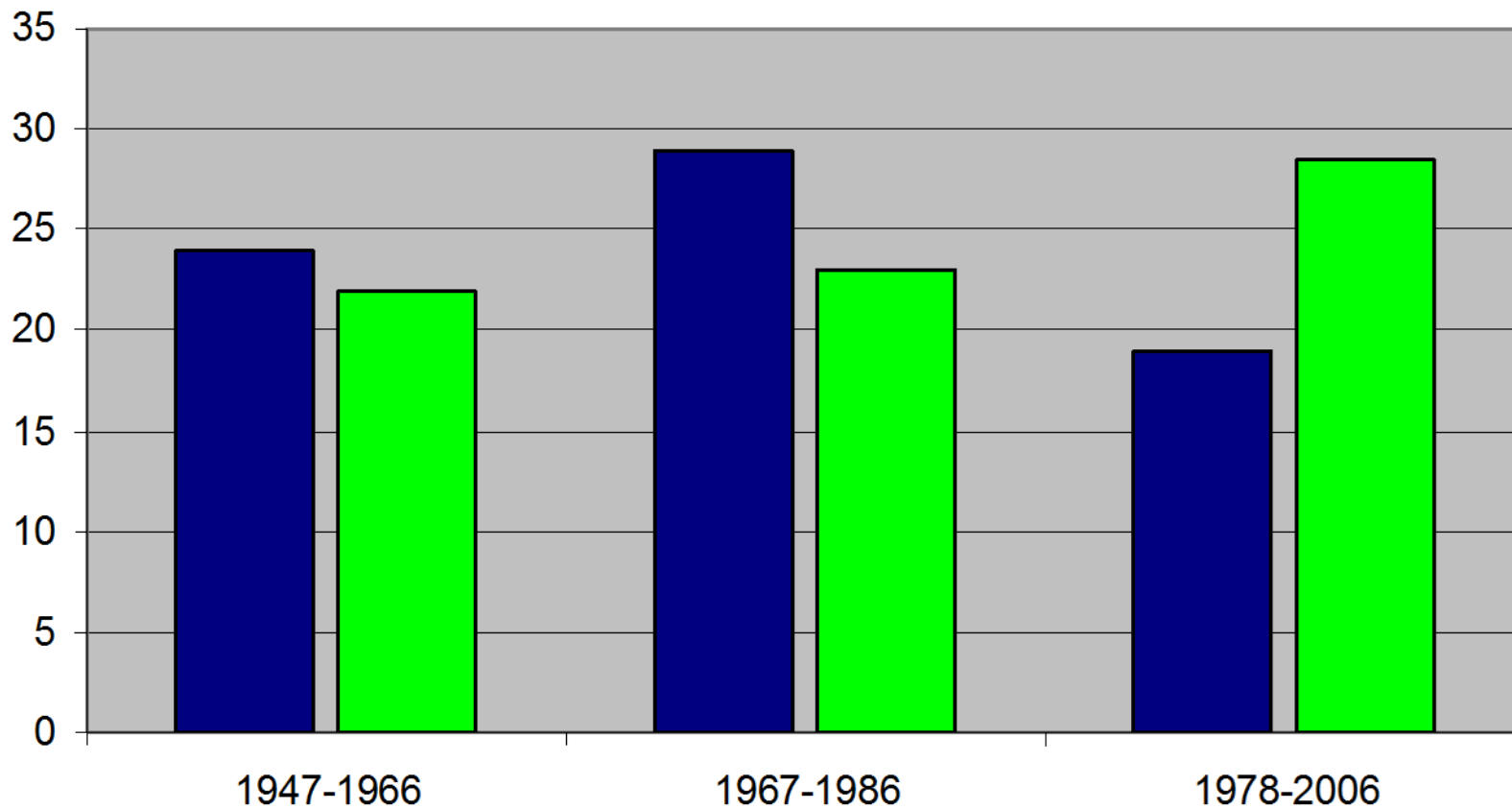
Source: Committee on Development and Intellectual Property (CDIP), 2013.

# Greatest US policy challenges

- Globalization and numbers work against selectivity of the best & brightest immigrants
- Domestic demand impacted by changes in composition of R&D and globalization (tradeable services) challenges STEM wage growth & domestic supply

## Foreign-Born of Nobel Laureates and STEM PhDs

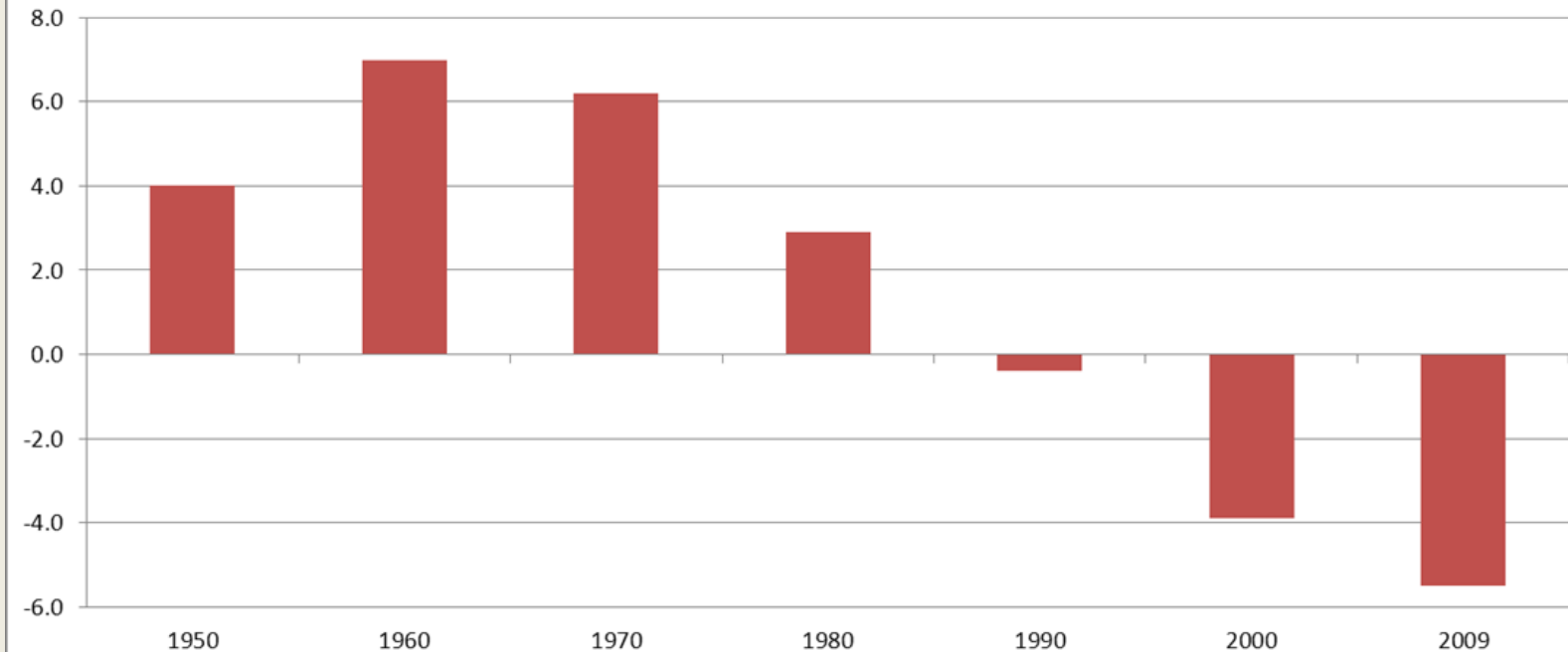
■ Percent of all laureates ■ Percent of PhD STEM



Source: Hunter et al., 2009, and author's calculations 30 year old PhDs



## Regression adjusted difference in core STEM earnings from the intended career occupations of STEM-oriented college freshman, percent



Note: Occupations identified as those which STEM interested college freshman believe to be of greatest post-graduation value other than STEM: medical practitioners, veterinarian, teacher (secondary), business executive/manager/administrator, lab technician or hygienist, lawyer or judge, therapist, accountant, pharmacist and architect.

Source: OLS regression of the natural log of annual earnings controlling for sex, nativity, experience, education, hours worked, weeks worked, city, metropolitan residence, and industry. Data are the US Census 1 percent samples 1950 thru 2000 and the 2009 American Community Survey.

# Final observations

- The global competition for highly skilled workers is not all about immigration policy and “more”
  - the USA retains a competitive edge with its economy, universities and job opportunities
- The growing global supply of STEM workers means the competition is for the truly best and brightest
  - Small nations can compete on attracting the best
- Admission visa policy matters and USA needs reform
  - policy should neither favor “fewer & harder” or “more & easier,” but rather “generous & targeted”