GLOBAL MIGRATION FLOWS OF SCIENTISTS AND THE STATUS OF INTERNATIONAL SCIENTISTS IN GERMANY

Emilio Zagheni (Max Planck Institute for Demographic Research)

Hochschulrektorenkonferenz (HRK) Advance – Feb 19th, 2024

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Ali Akbaritabar

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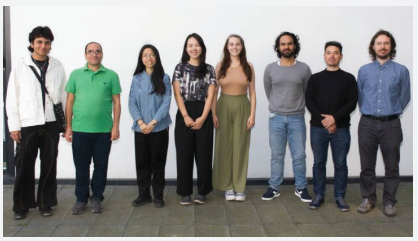
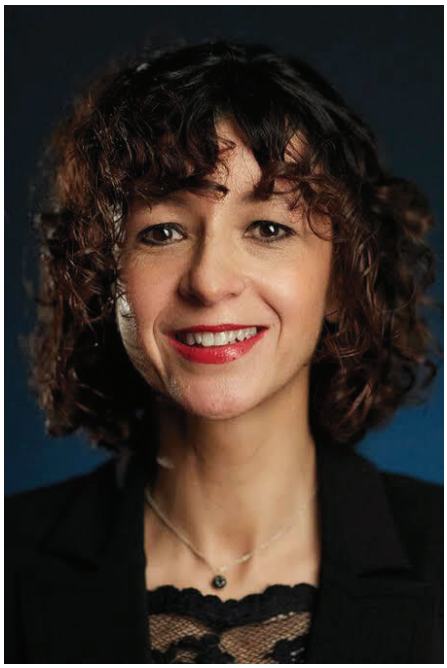


MPIDR Summer Incubator 2023

EMMANUELLE CHARPENTIER – NOBEL PRIZE WINNER 2020



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Cell Reports
Report

Structural Basis for Recognizing Phosphoarginine and Evolving Residue-Specific Protein Phosphatases in Gram-Positive Bacteria

Jakob Fuhrmann,[1,4] Beata Mierzwa,[2] Débora B. Trentini,[1] Silvia Spiess,[3] Anita Lehner,[1] Emmanuelle Charpentier,[3] and Tim Clausen[1,*]
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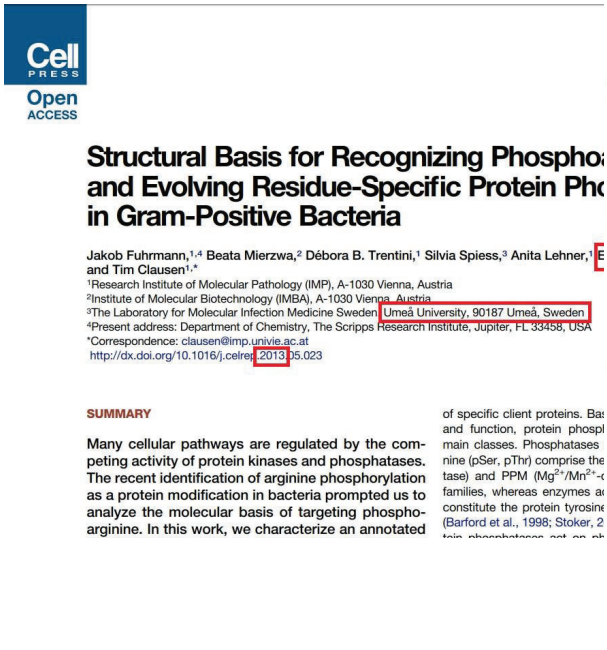
http://dx.doi.org/10.1016/j.celrep.2013.05.023

SUMMARY

Many cellular pathways are regulated by the competing activity of protein kinases and phosphatases. The recent identification of arginine phosphorylation as a protein modification in bacteria prompted us to analyze the molecular basis of targeting phosphoarginine. In this work, we characterize an annotated

of specific client proteins. Based on their sequence, structure, and function, protein phosphatases are grouped into three main classes. Phosphatases acting on phospho-serine/threonine (pSer, pThr) comprise the PPP (phospho protein phosphatase) and PPM (Mg^{2+}/Mn^{2+}-dependent protein phosphatase) families, whereas enzymes acting on phospho-tyrosine (pTyr) constitute the protein tyrosine phosphatase (PTP) superfamily (Barford et al., 1998; Stoker, 2005). In addition, specialized pro-



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Structural Basis for Recognizing Phospho and Evolving Residue-Specific Protein Pho in Gram-Positive Bacteria

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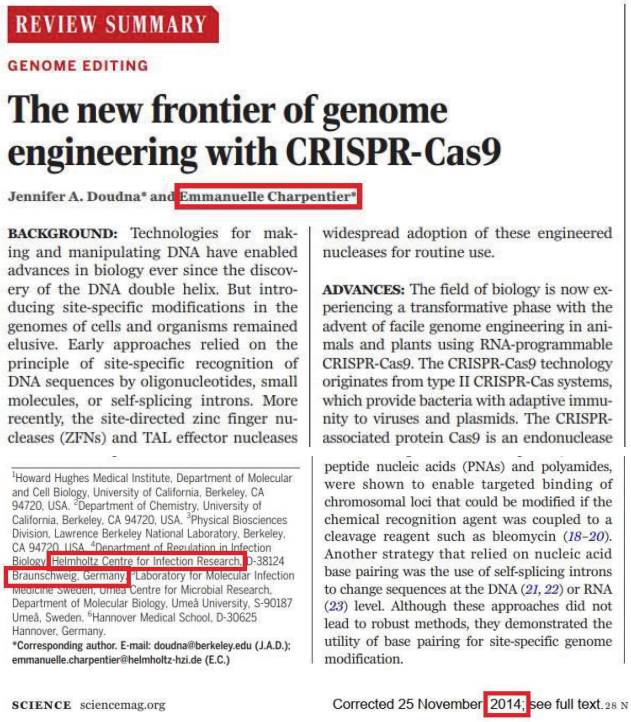

REVIEW SUMMARY

GENOME EDITING

The new frontier of genome engineering with CRISPR-Cas9

Jennifer A. Doudna* and Emmanuelle Charpentier*

BACKGROUND: Technologies for making and manipulating DNA have enabled advances in biology ever since the discovery of the DNA double helix. But introducing site-specific modifications in the genomes of cells and organisms remained elusive. Early approaches relied on the principle of site-specific recognition of DNA sequences by oligonucleotides, small molecules, or self-splicing introns. More recently, the site-directed zinc finger nucleases (ZFNs) and TAL effector nucleases

widespread adoption of these engineered nucleases for routine use.

ADVANCES: The field of biology is now experiencing a transformative phase with the advent of facile genome engineering in animals and plants using RNA-programmable CRISPR-Cas9. The CRISPR-Cas9 technology originates from type II CRISPR-Cas systems, which provide bacteria with adaptive immunity to viruses and plasmids. The CRISPR-associated protein Cas9 is an endonuclease

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peptide nucleic acids (PNAs) and polyamides, were shown to enable targeted binding of chromosomal loci that could be modified if the chemical recognition agent was coupled to a cleavage reagent such as bleomycin (*18*–*20*). Another strategy that relied on nucleic acid base pairing was the use of self-splicing introns to change sequences at the DNA (*21*, *22*) or RNA (*23*) level. Although these approaches did not lead to robust methods, they demonstrated the utility of base pairing for site-specific genome modification.

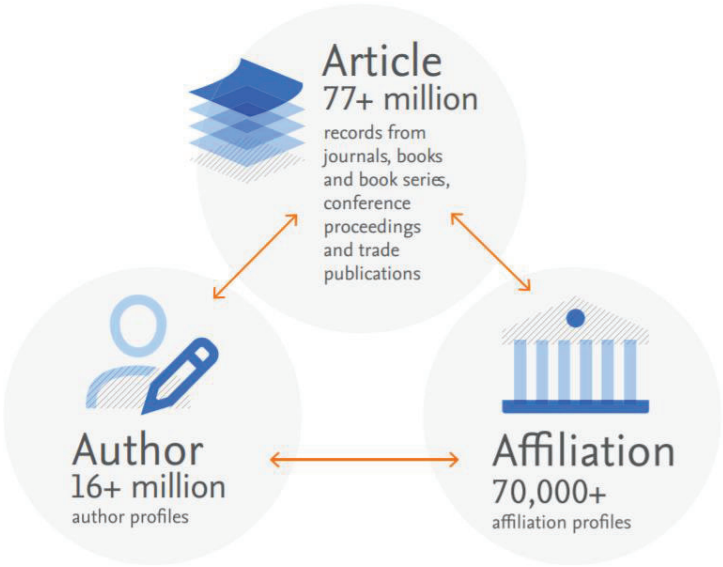
SCIENCE sciencemag.org

Corrected 25 November 2014; see full text. 28 N

A SIMPLE IDEA

Changes in institutional affiliations can be used to infer changes in residence over time for individual scholars and for populations

A SCALABLE IDEA: THE SCOPUS DATABASE



Data accessed via:

kompetenzzentrum bibliometrie
competence centre for bibliometrics

MAX PLANCK digital library

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OUTLINE

- **BACKGROUND ON THE DATA**
- **MIGRATION TRENDS AND PATTERNS**
- **GENDER INEQUALITIES AND INTERNATIONAL MOBILITY**
- **POLICY SHOCKS AND RETURN MIGRATION**

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DATA QUALITY

- **Author name disambiguation in Scopus:**

  98.3% of author profiles do not include publications written by someone else;

  90.6% of author profiles include all publications written by the author.

- **Organization disambiguation:**

  Research Organization Registry (ROR) API

- **Subset of data with the highest quality:**

  Period:1996-2020; Type of publications: Articles and Reviews;

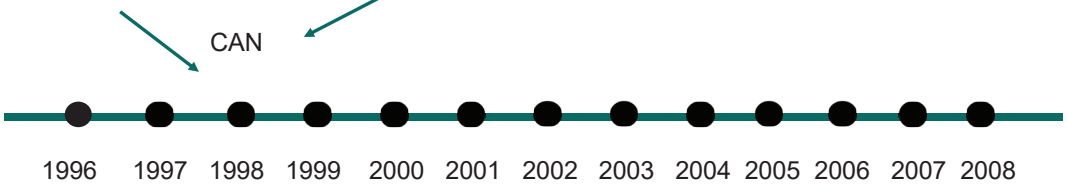
  → 36+ million publications

IDENTIFYING MIGRATION EVENTS: ILLUSTRATIVE EXAMPLES

IDENTIFYING MIGRATION EVENTS: ILLUSTRATIVE EXAMPLES

Maria's first publications are with a Canadian affiliation in 1998

Maria's country of "academic" birth is Canada, regardless of her citizenship or country of actual birth



The country of residence is inferred as the modal country of publications in a given year

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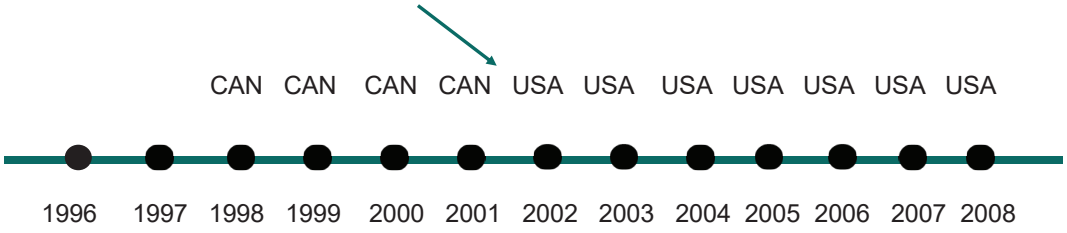
IDENTIFYING MIGRATION EVENTS: ILLUSTRATIVE EXAMPLES

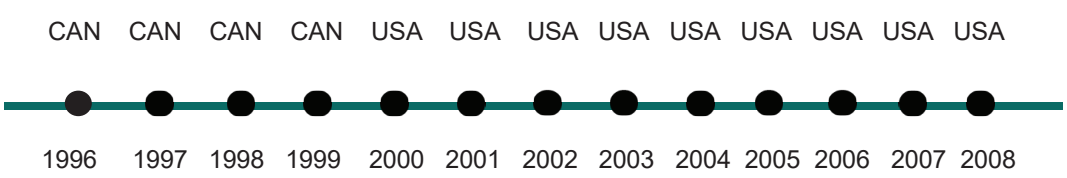
Maria changes residence from Canada to the US between 2001 and 2002



Maria's modal countries of publications over time

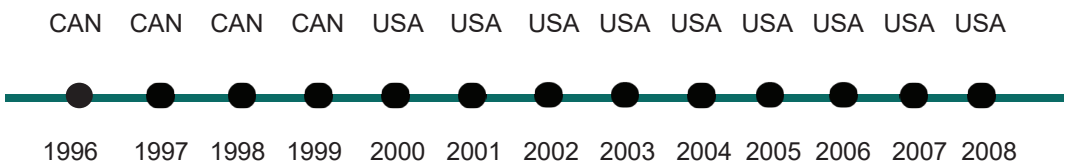
IDENTIFYING MIGRATION EVENTS: ILLUSTRATIVE EXAMPLES

Now, let's consider Joe



IDENTIFYING MIGRATION EVENTS: ILLUSTRATIVE EXAMPLES

For Joe, we may have a left-truncation issue: we do not know if he published and/or moved before 1996



ESTIMATING GENDER USING FIRST NAMES

ESTIMATING GENDER USING FIRST NAMES

- Core Dictionary: World Gender-Name Dictionary (WGND), which includes 6.2 million names from 182 countries

- If the name is still missing check other tools like genderize.io

- Validate the results against manually curated dictionaries for 30k+ names

VALIDATION AGAINST MANUALLY CURATED DATA SETS

Of the names that we classified as female, 90% are actually female

		Indian names	Arabic /Persian names	Japanese names	Chinese names	German names	Russian names
Precision	**female**	90.49%	94.91%	90.49%	50.55%	98.35%	97.73%
	male	80.92%	95.39%	91.26%	87.60%	97.54%	96.83%
Recall	**female**	96.25%	96.96%	92.34%	50.30%	98.06%	99.23%
	male	96.22%	92.89%	98.72%	55.05%	98.00%	97.75%

Out of all female names, we correctly classified 96% as female

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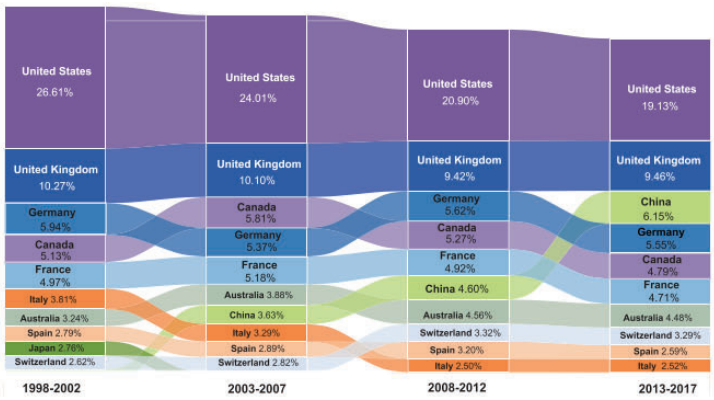
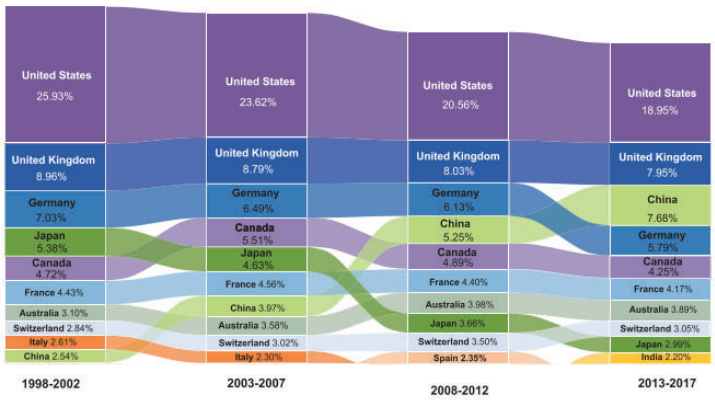
TOP 10 DESTINATION COUNTRIES

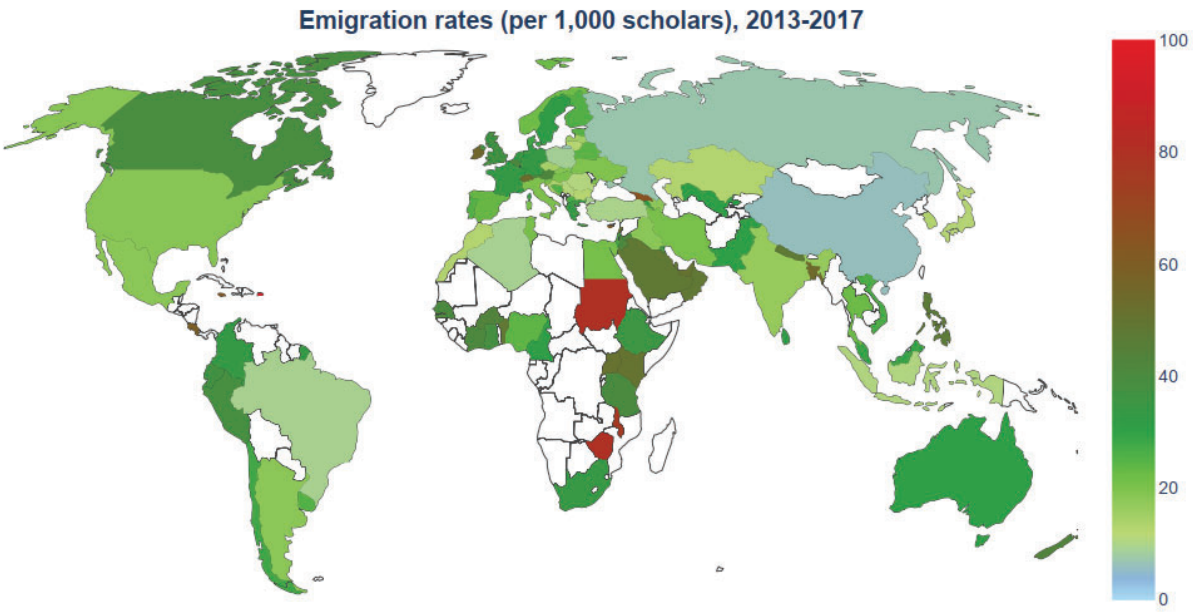


Female migrant researchers



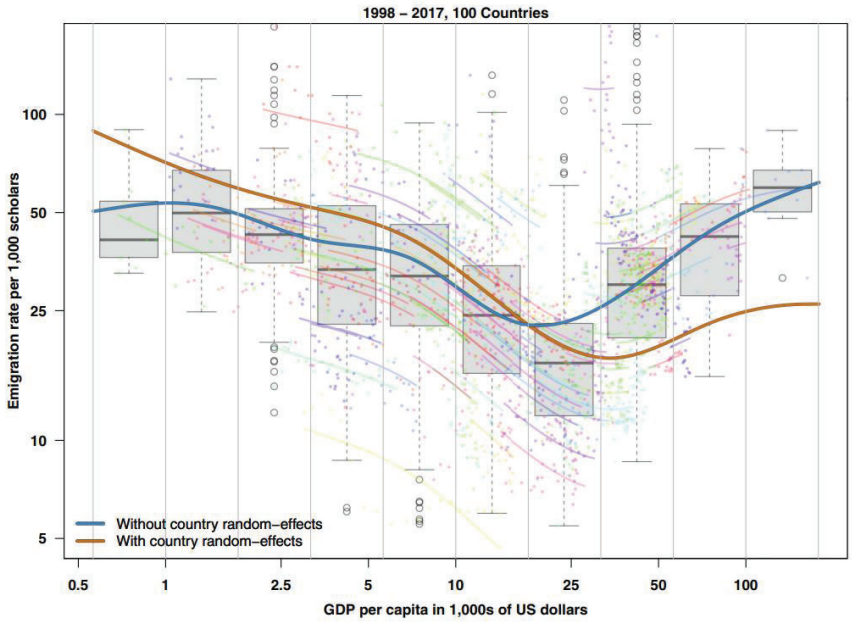
Male migrant researchers

Zhao, Akbaritabar, Kashyap, Zagheni (2023) PNAS



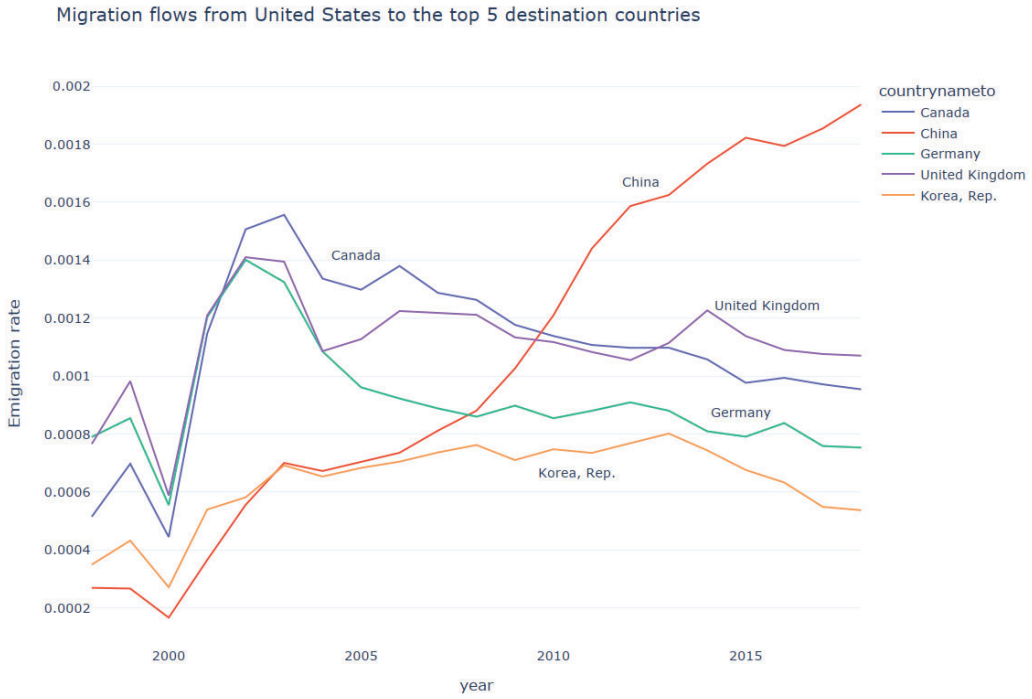
Sanliturk, Zagheni, Danko, Theile, Akbaritabar (2023) PNAS

MIGRATION AND ECONOMIC DEVELOPMENT

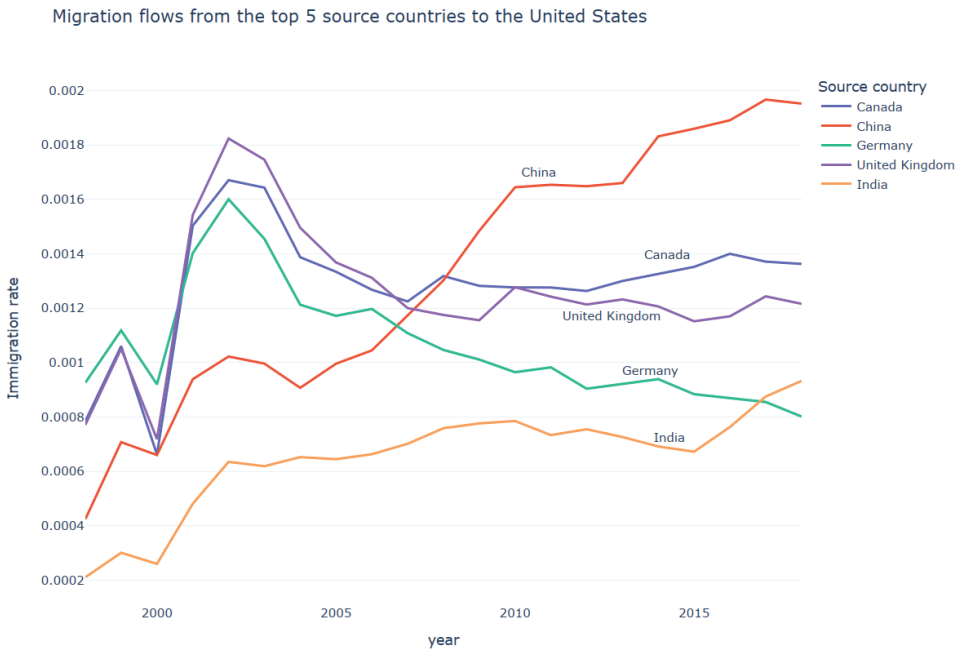


Sanliturk, Zagheni, Danko, Theile, Akbaritabar (2023) PNAS

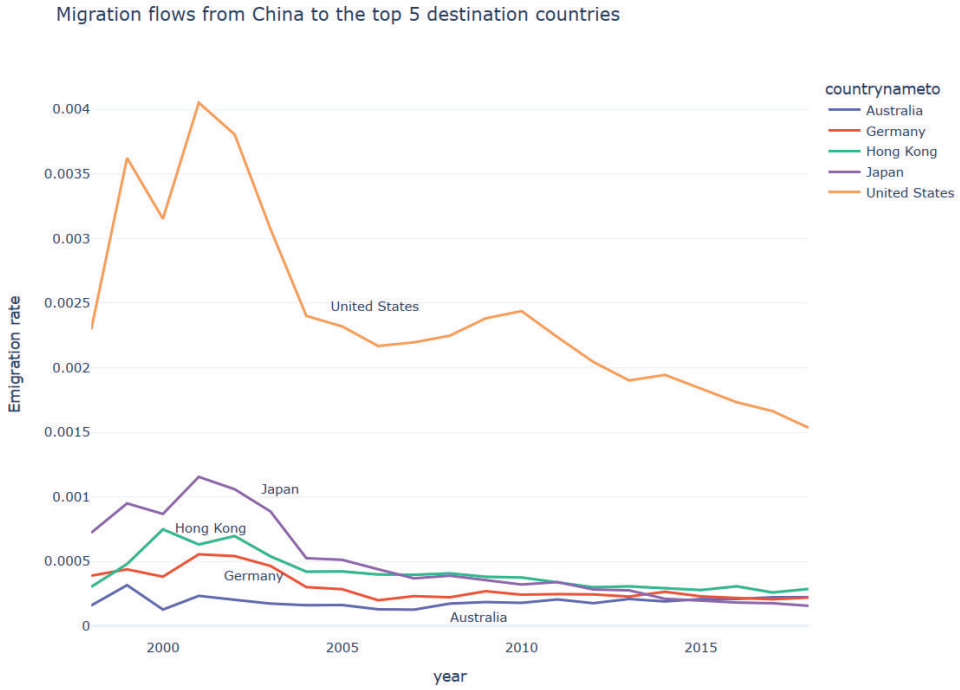
INTERNATIONAL OUT-MIGRATION FROM THE UNITED STATES



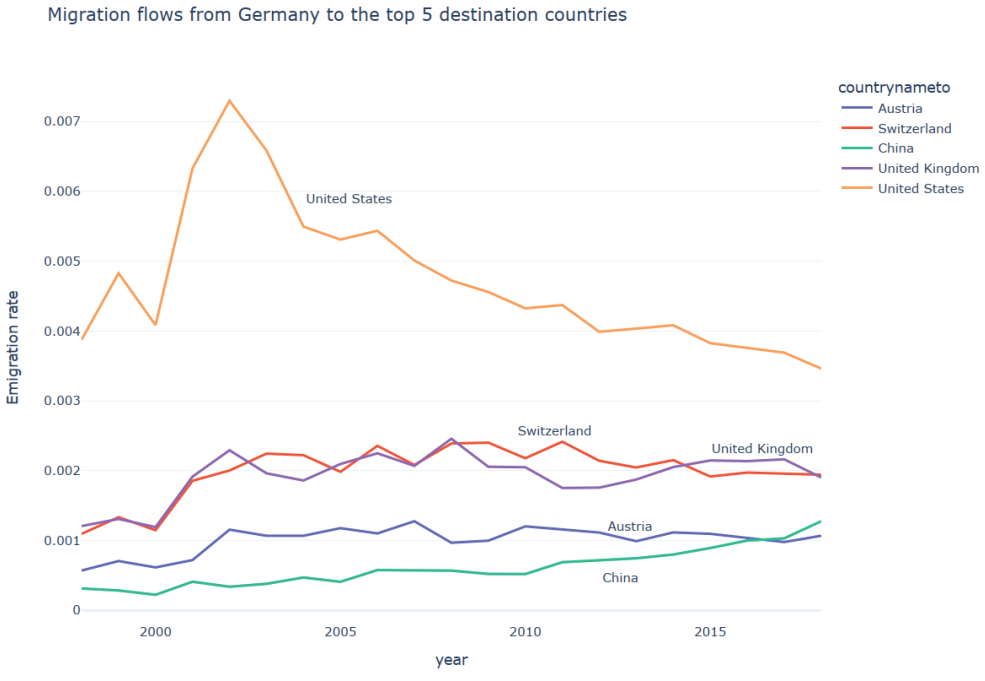
INTERNATIONAL IN-MIGRATION TO THE UNITED STATES



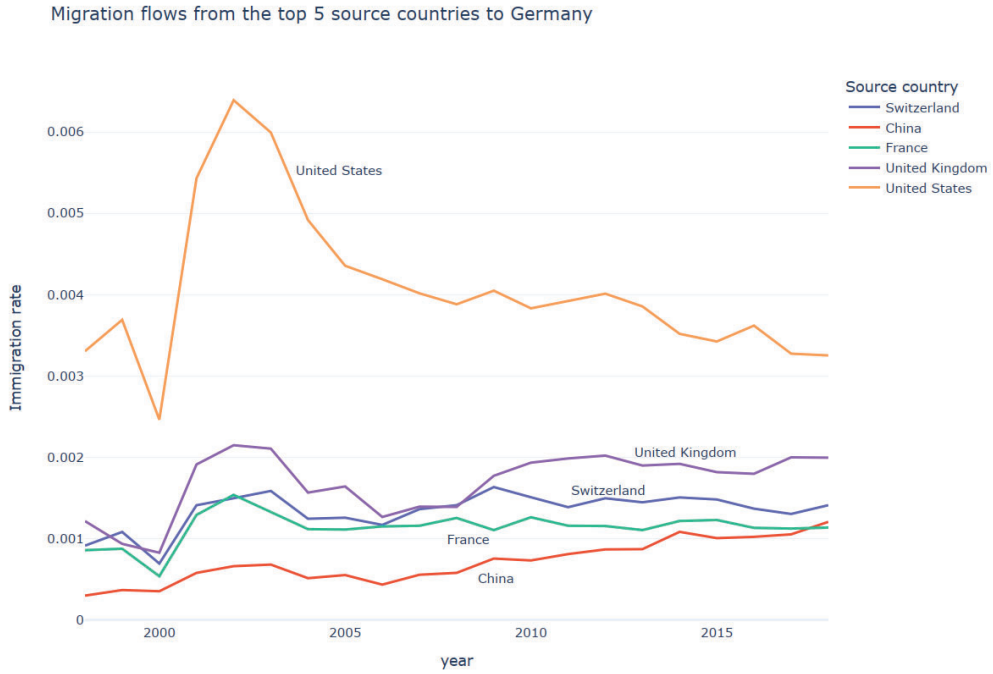
INTERNATIONAL OUT-MIGRATION FROM CHINA



INTERNATIONAL OUT-MIGRATION FROM GERMANY

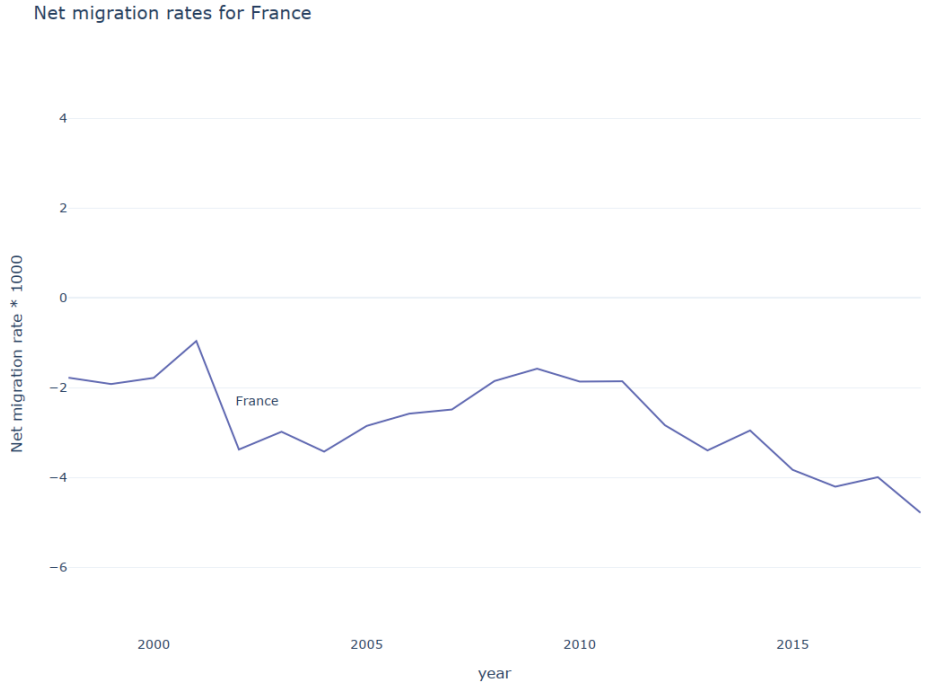


INTERNATIONAL IN-MIGRATION TO GERMANY

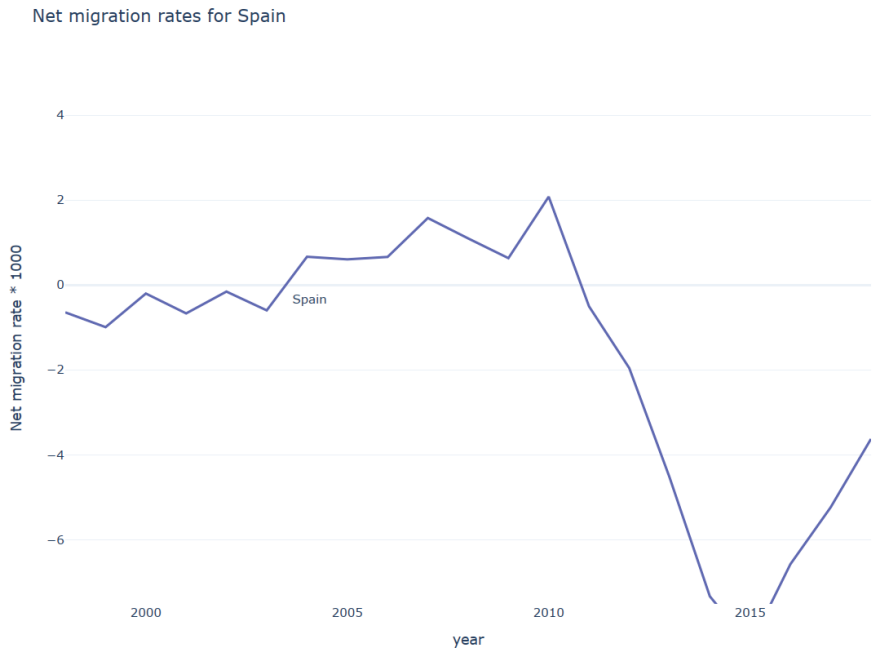


NET MIGRATION RATE – GERMANY

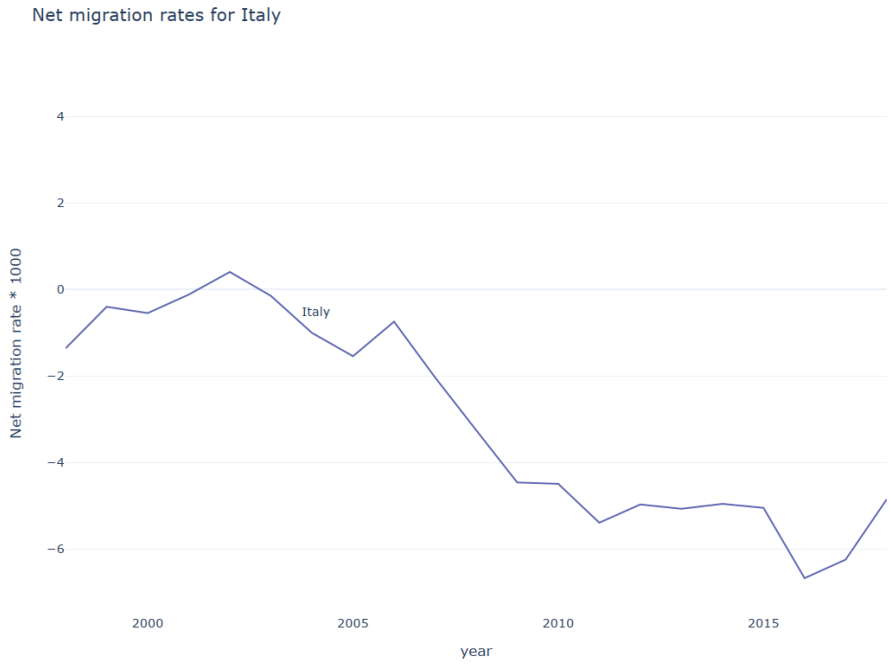
NET MIGRATION RATE – FRANCE



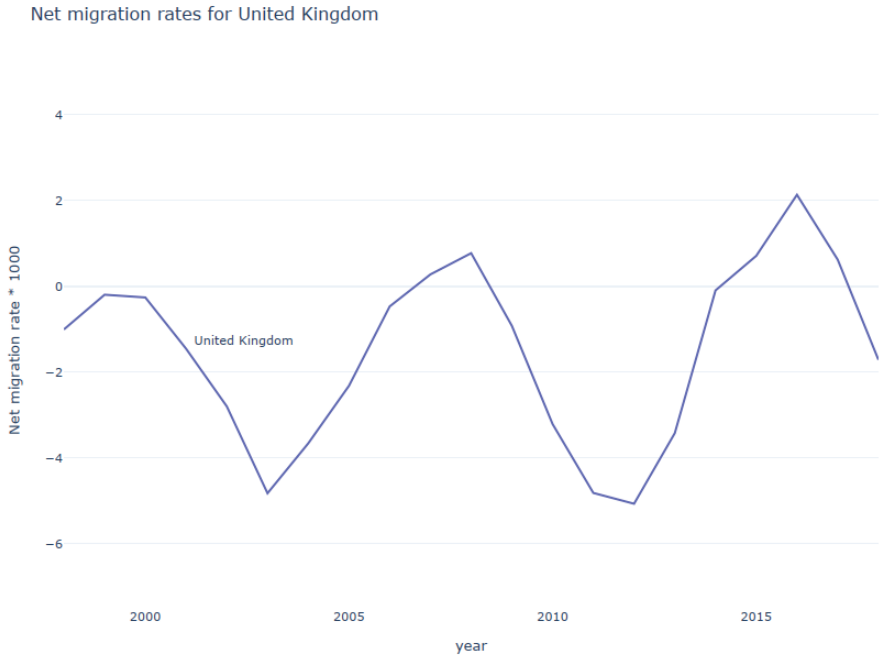
NET MIGRATION RATE – SPAIN



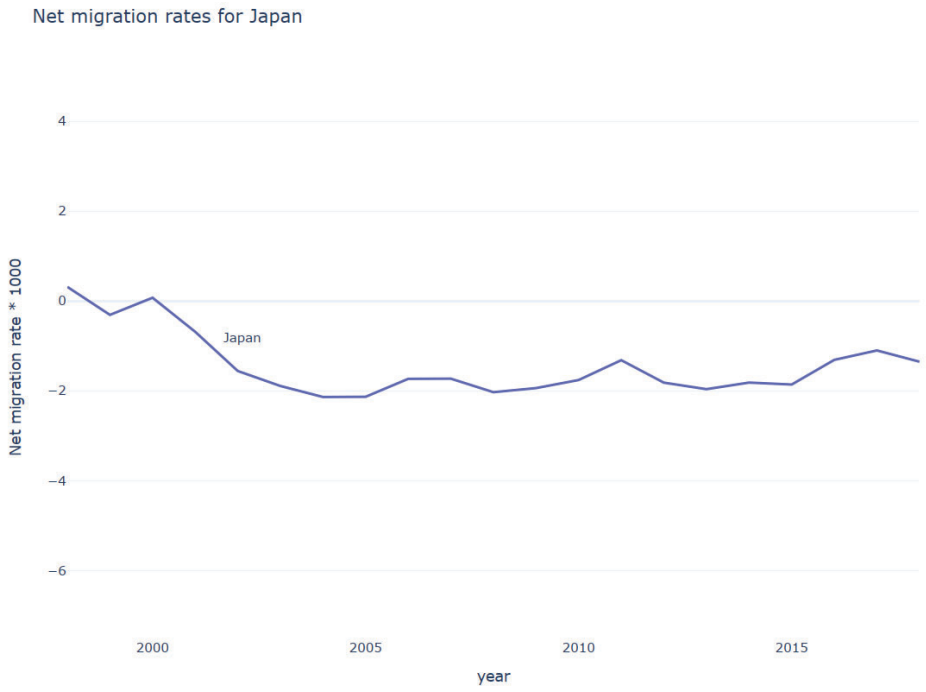
NET MIGRATION RATE – ITALY



NET MIGRATION RATE – GREAT BRITAIN

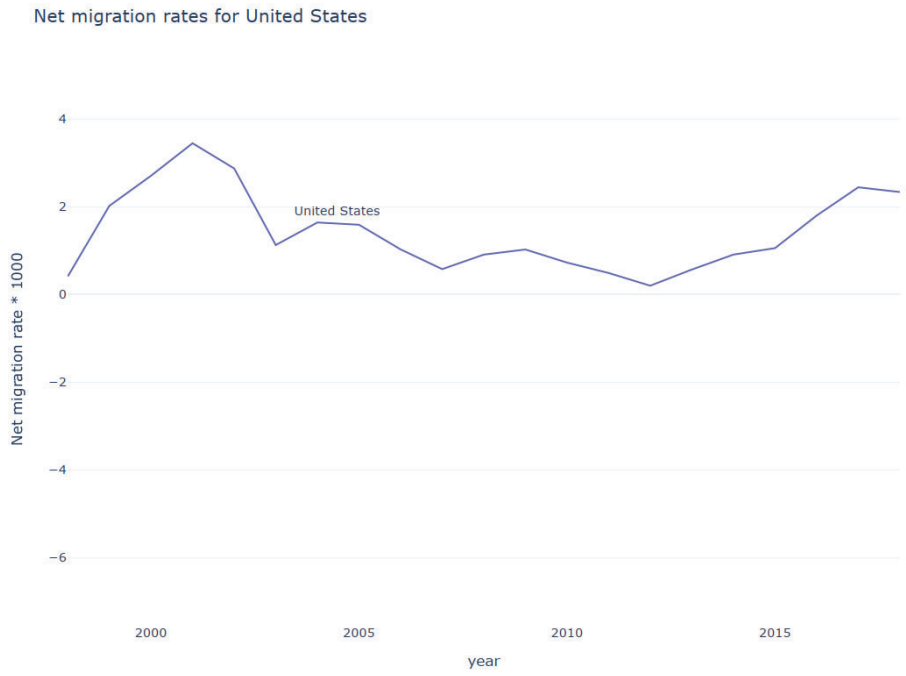


NET MIGRATION RATE – JAPAN



NET MIGRATION RATE – CHINA

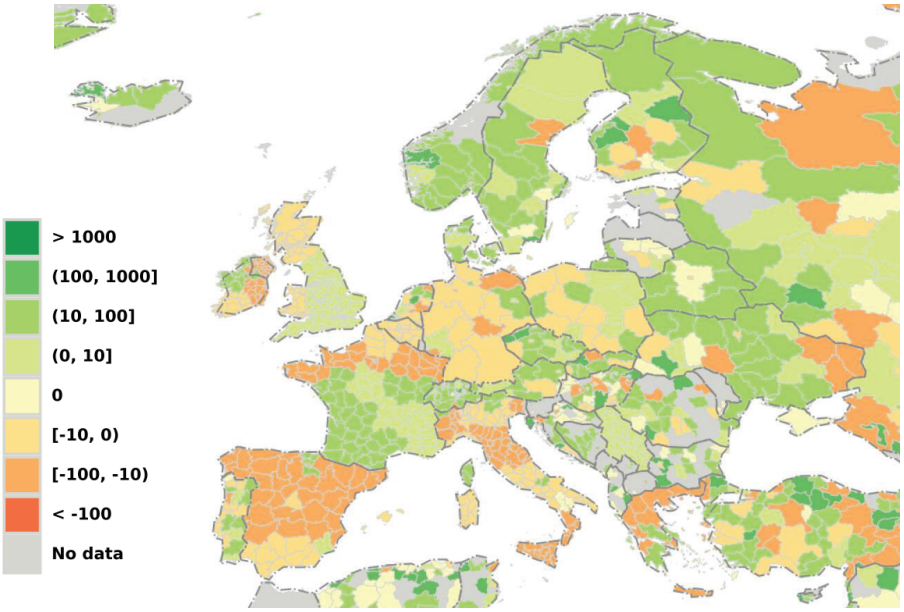
NET MIGRATION RATE – USA



NET MIGRATION RATE – GERMANY

HETEROGENEITY AT THE SUBNATIONAL LEVEL

Subnational net migration rates (per 1000 scholars, 2012-2017)



Most attractive

FR: Nouvelle-Aquitaine,Occitanie, Burgogne
PL: Podkarpackie, Kujawsko-Pomorskie, Lubuskie
ES: La Rioja, Navarra
IT: parts of Trentino-South-Tyrol, Lombardy, Molise
DE: Brandenburg

Losing scholars

FR: Northern
ES: Almost whole country
DE: Thuringia, Mecklenburg-Vorpommern
IT: Most of the country

Akbaritabar et al.(2023) MPIDR Working Paper

OUTLINE

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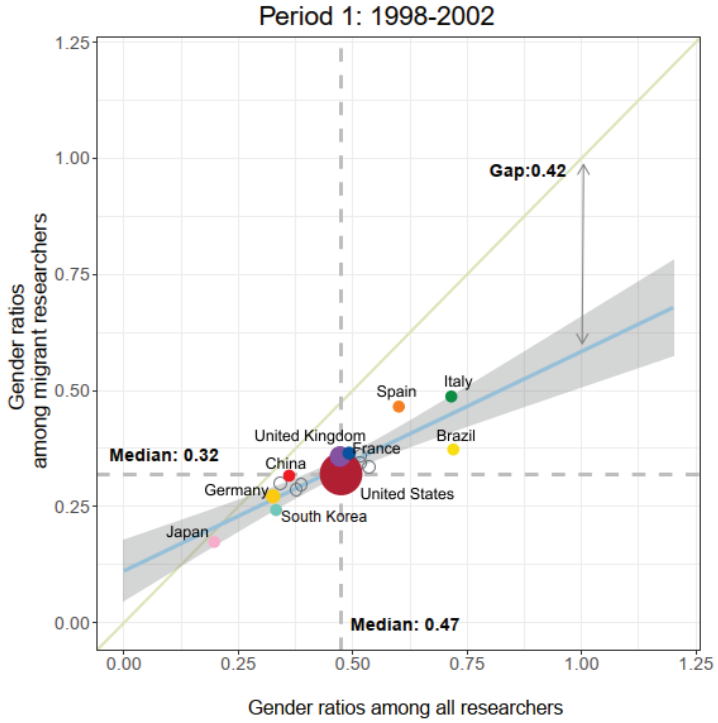
WOMEN'S REPRESENTATION IN INTERNATIONAL MOBILITY

- Progress has been made towards gender equality in science, but women continue to face considerable barriers to participating and advancing in the academic labor force

- International mobility has been recognized as a strategy for scientists to expand their networks and visibility and advance professionally

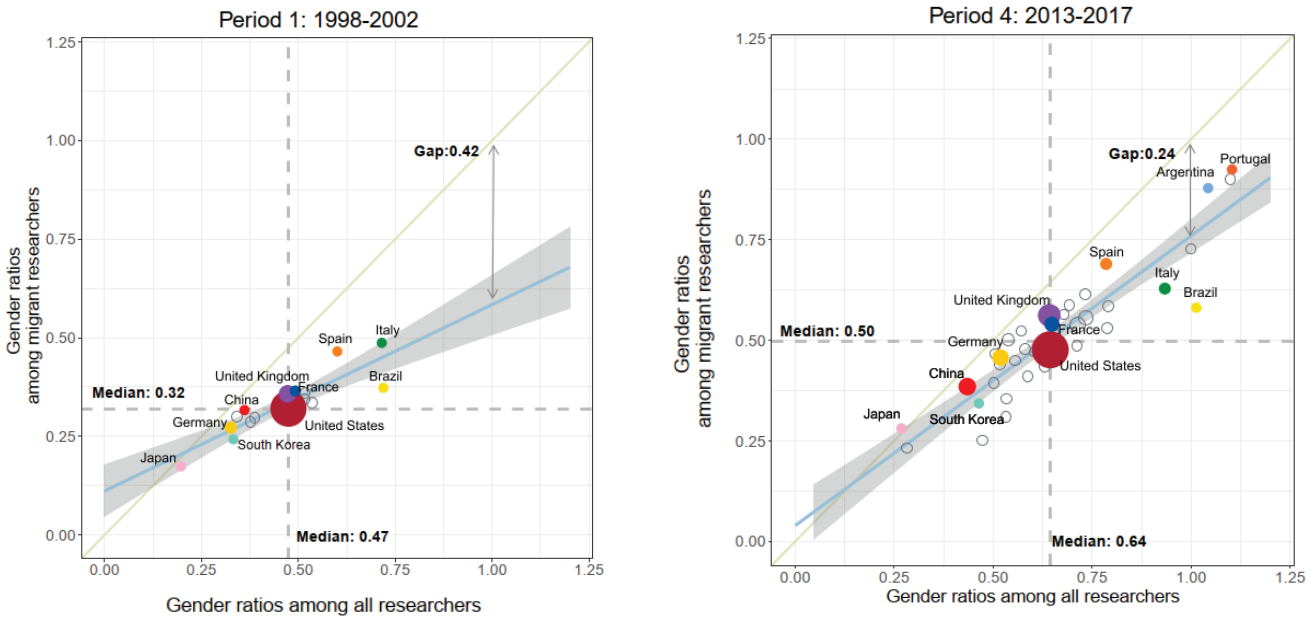
- International mobility could help narrow the gender gap in academic careers (or could amplify it)

WOMEN TO MEN RATIOS FOR SCHOLARS AND MIGRANT SCHOLARS



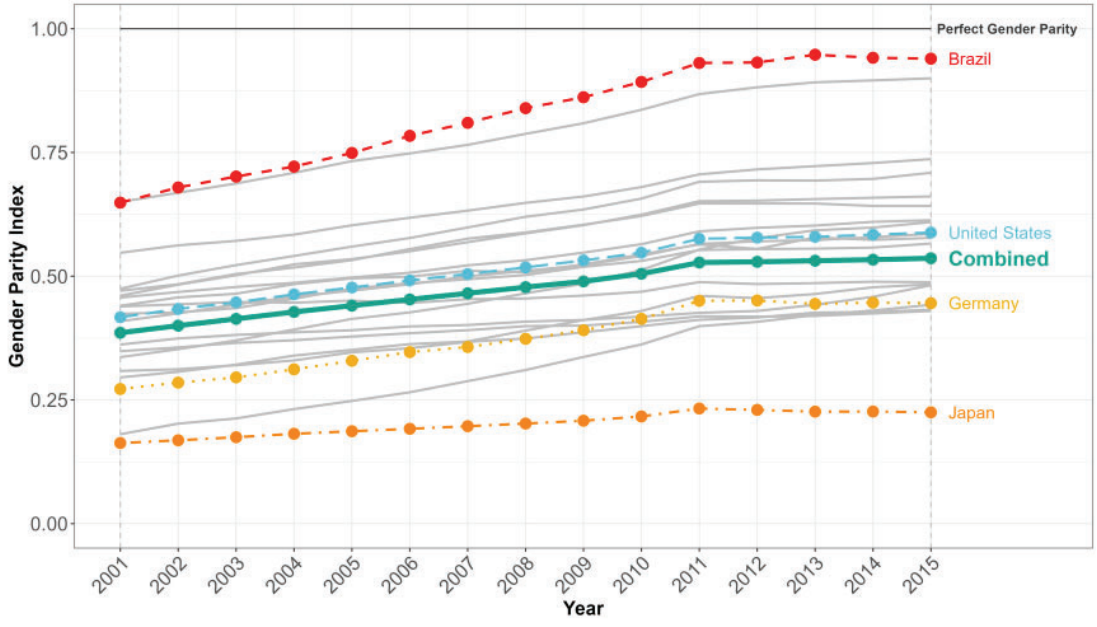
Zhao, Akbaritabar, Kashyap, Zagheni (2023) PNAS

GENDER RATIOS FOR MIGRANTS CONVERGING TO THOSE OF THE GENERAL POPULATION OF SCHOLARS



Zhao, Akbaritabar, Kashyap, Zagheni (2023) PNAS

TRENDS IN GENDER PARITY



Kim, Carrasco,Vishnoi et al. (In progress)

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FLOWS FROM GERMANY AND RETURN RATES

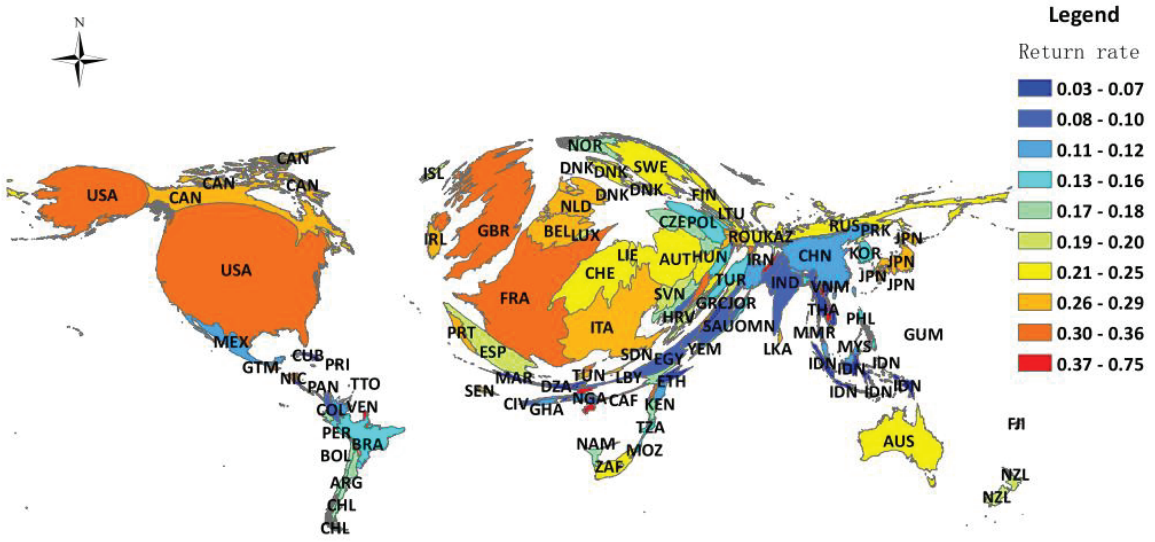
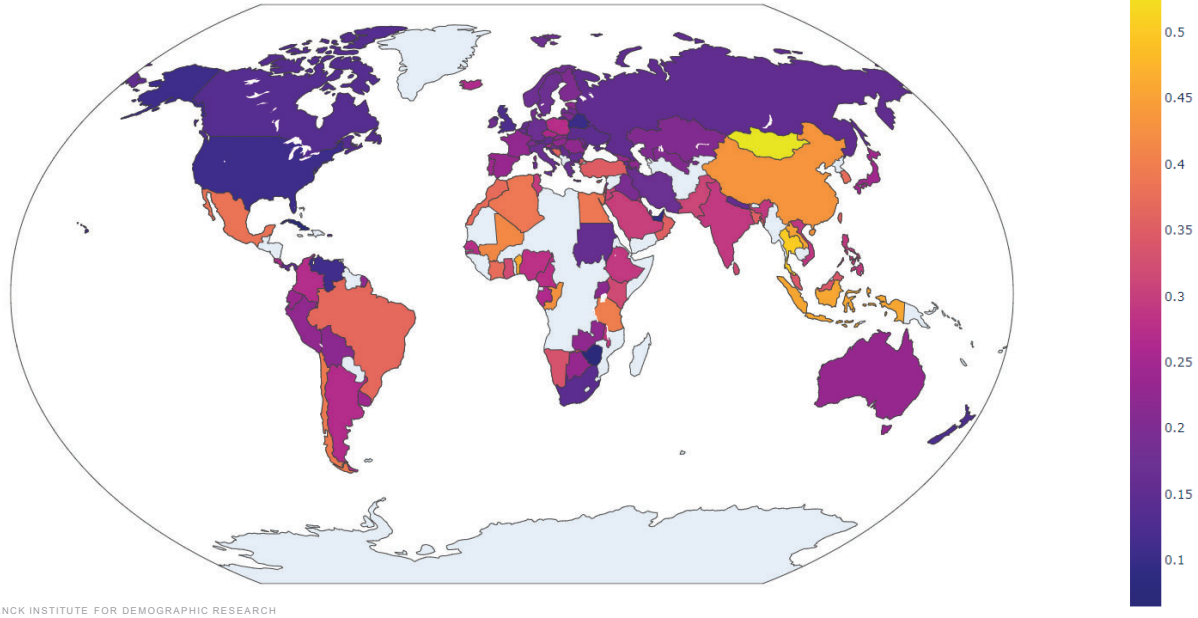


Fig. 2 Outward flows (from Germany) and respective return rates across countries. The sizes of the countries are proportional to the flows of outward researchers from Germany. The colors indicate the differences in the return rates of the German-affiliated researchers returning to Germany from each country.

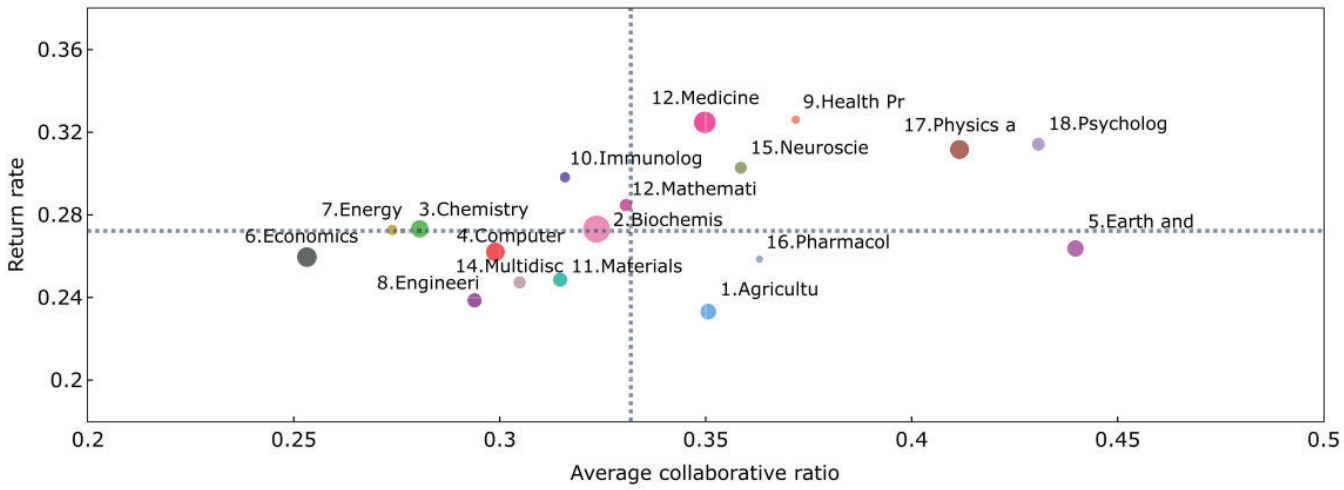
Zhao et al.(2022) Scientometrics

RETURN MIGRATION – COHORT OF 2000

Ratio of scholars who returned after spending at least 3 years abroad

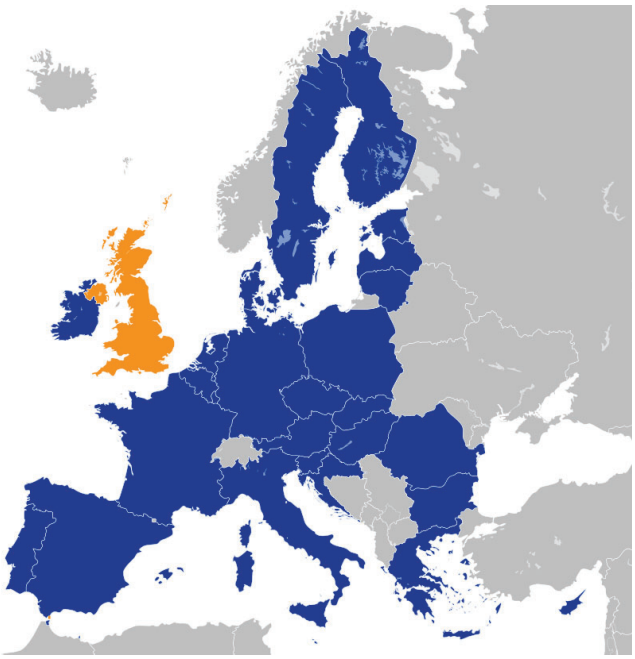


RETURN RATE TO GERMANY AND FRACTION OF PUBLICATIONS WITH SCHOLARS BASED AT GERMAN INSTITUTIONS

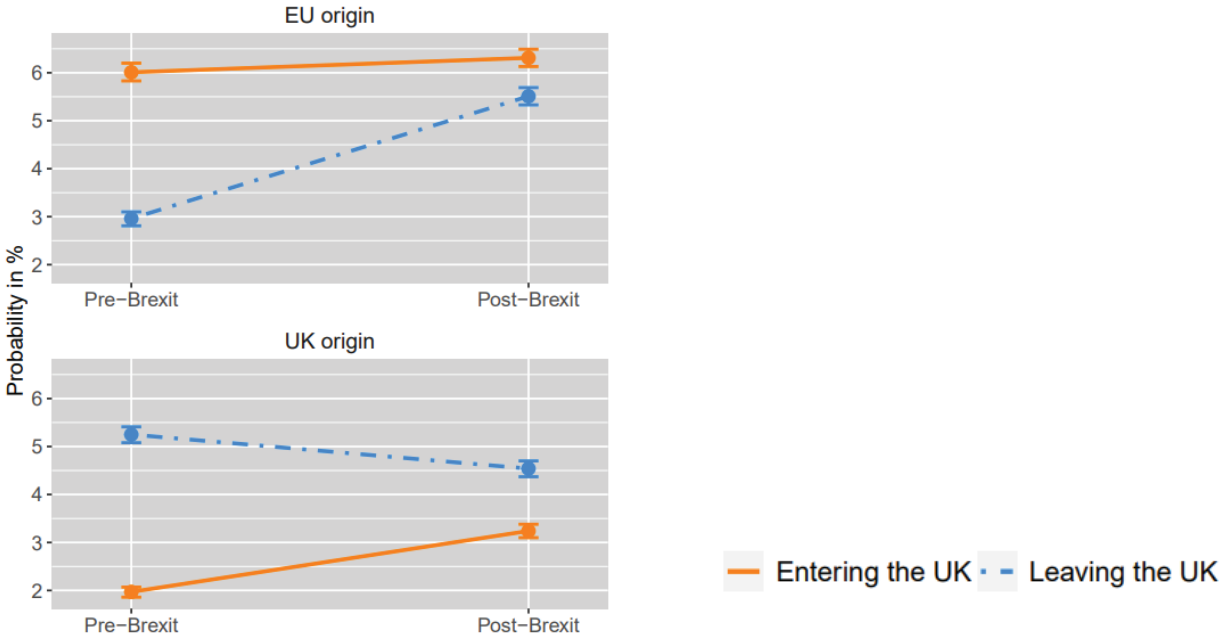


Zhao et al.(2022) Scientometrics

POLICY SHOCKS: HOW DID BREXIT AFFECT MIGRATION OF SCHOLARS?



POLICY SHOCKS: HOW DID BREXIT AFFECT MIGRATION OF SCHOLARS?



Sanliturk et al.(2023) MPIDR Working Paper

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SOME REFLECTIONS

- Germany is among the top four worldwide destination countries for scientists and has benefited from playing a central role in the mobility of scholars across Europe and North America.
- Valuable investments in research are paying off and should continue.
- Key opportunities for the future include strengthening exchange with the Global South and its pool of talent
- Further increasing the representation of women in the global circulation of talent should also be a goal as Germany has room for improvement in this dimension.
- China has been changing the landscape of scientific mobility. The future may depend also on broader geopolitical constellations
- Not one Germany, but diversity of contexts and heterogeneity across regions
- Policy shocks like Brexit may create disruption. Ultimately science is at its best when circulation and recombination of ideas is favored

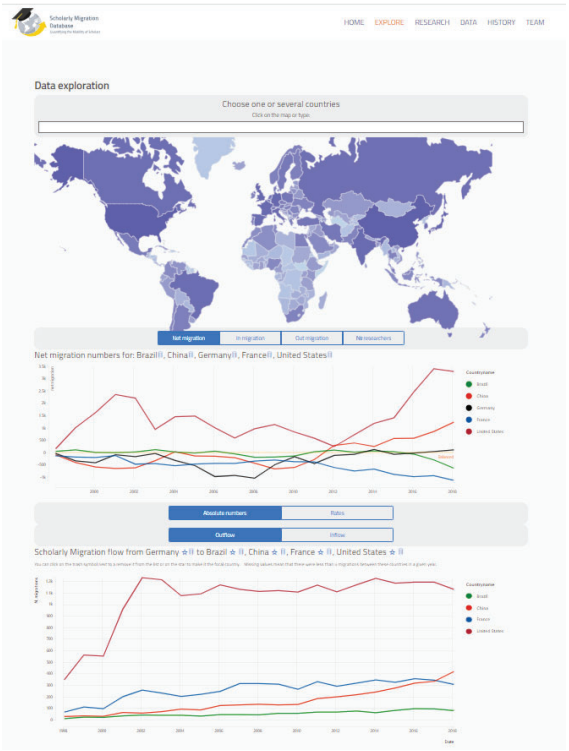
Scholarly Migration Database

Quantifying the Mobility of Scholars

www.scholarlymigration.org

Scholarly Migration Database

Quantifying the Mobility of Scholars



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www.scholarlymigration.org/exploration.html

THANK YOU!

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