

# Motivation

- Scientific mobility data is usually:
  - Heterogeneous
  - Statistics are often incomplete (e.g., African countries)
  - **Mobility types are pre-defined!**
- The use of large-scale analysis can lead to further insights on scientific mobility and migration
- The potential to combine mobility and bibliometric indicators to better understand the role of mobility on scientific progress

# Mobility framework

- Mobility changes are traced through affiliation linkages:
  - 1) changes in affiliation
  - 2) co-affiliation
- A internationally **mobile scholar** is that who has affiliated with  $>1$  countries

# What We Talk About When We Talk About Mobility...

## Is g-index better than h-index? An exploratory study at the individual level

By: **Costas, R** (Costas, Rodrigo)<sup>[1]</sup>; **Bordons, M** (Bordons, Maria)<sup>[1]</sup>

SCIENTOMETRICS

Volume: 77 Issue: 2 Pages: 267-288

DOI: 10.1007/s11192-007-1997-0

Published: NOV 2008

[View Journal Information](#)

### Author Information

Reprint Address: Costas, R (reprint author)

+ CINDOC CSIC, Ctr Informac & Documentac Cient, Joaquin Costa 22, Madrid, Spain.

### Addresses:

+ [1] CINDOC CSIC, Ctr Informac & Documentac Cient, Madrid, Spain

E-mail Addresses: [rodrigo.costas@cindoc.csic.es](mailto:rodrigo.costas@cindoc.csic.es)

## Is Scientific Literature Subject to a 'Sell-By-Date'? A General Methodology to Analyze the 'Durability' of Scientific Documents

By: **Costas, R** (Costas, Rodrigo)<sup>[1]</sup>; **van Leeuwen, TN** (van Leeuwen, Thed N.)<sup>[1]</sup>; **van Raan, AFJ** (van Raan, Anthony F. J.)<sup>[1]</sup>

JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY

Volume: 61 Issue: 2 Pages: 329-339

DOI: 10.1002/asi.21244

Published: FEB 2010

[View Journal Information](#)

### Author Information

Reprint Address: Costas, R (reprint author)

+ Leiden Univ, Ctr Sci & Technol Studies CWTS, Wassenaarseweg 62A, POB 905, NL-2300 AX Leiden, Netherlands.

### Addresses:

+ [1] Leiden Univ, Ctr Sci & Technol Studies CWTS, NL-2300 AX Leiden, Netherlands

E-mail Addresses: [rcostas@cwts.leidenuniv.nl](mailto:rcostas@cwts.leidenuniv.nl); [leeuwen@cwts.leidenuniv.nl](mailto:leeuwen@cwts.leidenuniv.nl); [vanraan@cwts.leidenuniv.nl](mailto:vanraan@cwts.leidenuniv.nl)



# Some examples



**Chris G. Antonopoulos**

Year	Country	P
0	Greece	2
1	Greece	1
2	Belgium	1
3	Belgium	1
3	Greece	2
4	Greece	1
4	Belgium	1
5	United Kingdom	1
6	United Kingdom	3
7	United Kingdom	1



# Some examples



**Jacobo López-Pavón**

<b>Year</b>	<b>Country</b>	<b>P</b>
<b>0</b>	<b>Spain</b>	<b>1</b>
<b>1</b>	<b>Spain</b>	<b>3</b>
<b>2</b>	<b>Spain</b>	<b>1</b>
<b>3</b>	<b>United Kingdom</b>	<b>2</b>
<b>4</b>	<b>United Kingdom</b>	<b>1</b>
<b>5</b>	<b>Italy* UK*</b>	<b>1</b>
<b>6</b>	<b>Italy</b>	<b>1</b>
<b>7</b>	<b>Italy</b>	<b>3</b>

# Some examples

JOSEP BASELGA REGRESA A EEUU

## Fuga de un cerebro ilustre

▪ Seguirá vinculado al Vall d'Hebron aunque esté al frente del Hospital de Massachusetts

Actualizado jueves 11/03/2010 11:52 (CET)



MARÍA VALERIO

MADRID.- Es uno de los oncólogos más reputados de nuestro país, uno de los que ocupa un cargo más alto en las sociedades científicas internacionales, y uno de los que más recursos económicos ha sabido aglutinar para luchar contra el cáncer. Pero se va. Josep Baselga (Barcelona, 1959), responsable de la oncología médica en el Hospital Vall d'Hebron de Barcelona, ha decidido cruzar el charco y empezar una nueva etapa de su vida en el Hospital General de Massachusetts (EEUU).

Hace unos días que el propio interesado negaba la mayor al ser preguntado por ELMUNDO.es acerca



▲ El investigador Josep Baselga. (Foto: Domènec Umbert)

## José Baselga

Year	Country	P
0	Spain	15
1	Spain	13
2	Germany*/Spain*	1
2	Spain	14
2	USA*/Spain*	2
3	USA*/Spain*	7
3	USA	5
4	USA*/Spain*	11
4	USA	9

# How to be mobile?

- **Migrants**: scholars who move from one country to another, with at least a year where they are not be affiliated to their country of origin.

	<i>t0</i>	<i>t1</i>	<i>t2</i>	<i>t3</i>
R1	C1	C2	C3	C1

- **Travelers (directional)**: scholars who, in addition to being affiliated to a new country, keep an affiliation to their country of origin.

	<i>t0</i>	<i>t1</i>	<i>t2</i>	<i>t3</i>
R2	C1	C1/C2	C1/C2/C3	...

- **Travelers (non-directional)**: scholars who have more than one country of affiliation, but for which it is impossible to determine a direction

	<i>t0</i>	<i>t1</i>	<i>t2</i>	<i>t3</i>
R3	C1/C2/C3	C1/C3	C2/C3	...

Event	$t_0 [t_n]$	$t_1 [t_{n+1}]$	Mobile	Break?	Mobility type
$E_1$	$C_1$		No	No	Not mobile
$E_2$	$C_1$	$C_1$	No	No	Not mobile
$E_3$	$C_1$	$C_x$	Yes	Yes	Migrant
$E_4$	$C_1$	$C_x/C_x$	Yes	Yes	Migrant
$E_5$	$C_1$	$C_x^*/C_x^*$	Yes	Yes	Migrant
$E_6$	$C_1/C_x$		Yes	No	Traveler (ND)
$E_7$	$C_1^*/C_x^*$		Yes	No	Traveler (ND)
$E_8$	$C_1$	$C_1/C_x$	Yes	No	Traveler (D)
$E_9$	$C_1$	$C_1^*/C_x^*$	Yes	No	Traveler (D)
$E_{10}$	$C_1/C_x$	$C_1$	Yes	No	Traveler (D)
$E_{11}$	$C_1/C_x$	$C_x$	Yes	No	Traveler (D)
$E_{12}$	$C_1/C_x$	$C_1/C_x$	Yes	No	Traveler (ND)
$E_{13}$	$C_1/C_x$	$C_1^*/C_x^*$	Yes	No	Traveler (ND)
$E_{14}$	$C_1^*/C_x^*$	$C_1$	Yes	No	Traveler (D)
$E_{15}$	$C_1^*/C_x^*$	$C_x$	Yes	No	Traveler (D)
$E_{16}$	$C_1^*/C_x^*$	$C_1/C_x$	Yes	No	Traveler (ND)
$E_{17}$	$C_1^*/C_x^*$	$C_1^*/C_x^*$	Yes	No	Traveler (ND)

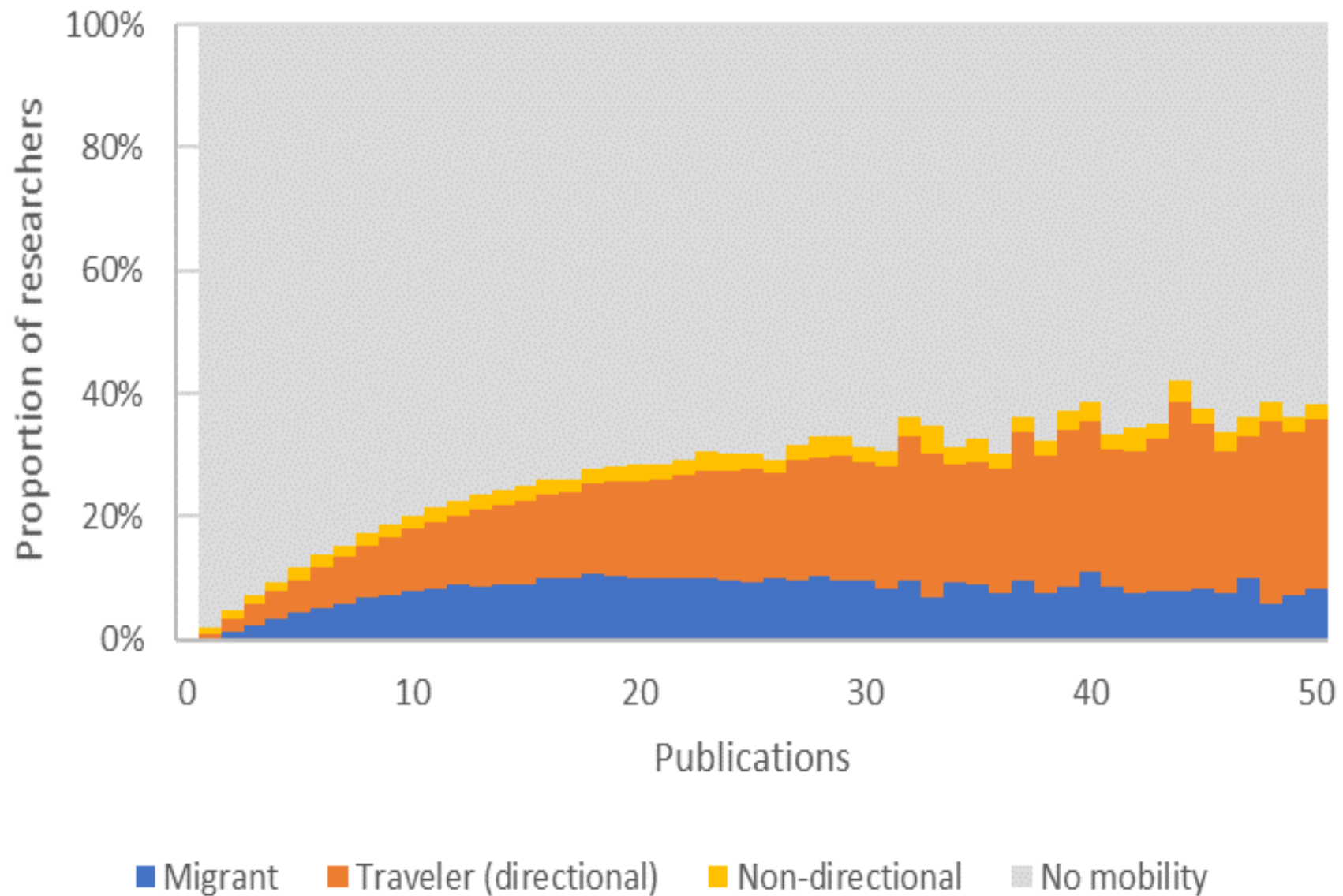
# Methodology

- Web of Science database
- Publications from 2008 onwards, linkages between authors and affiliations
  - 14 million publications, linked to 15.9 million scholars
- Researchers are identified using an author name disambiguation algorithm (Caron & van Eck, 2014)
- Linkages between authors and affiliations as in their publications
- “Country/ies of origin” of a researcher is the country/ies where her first publication(s) was published.

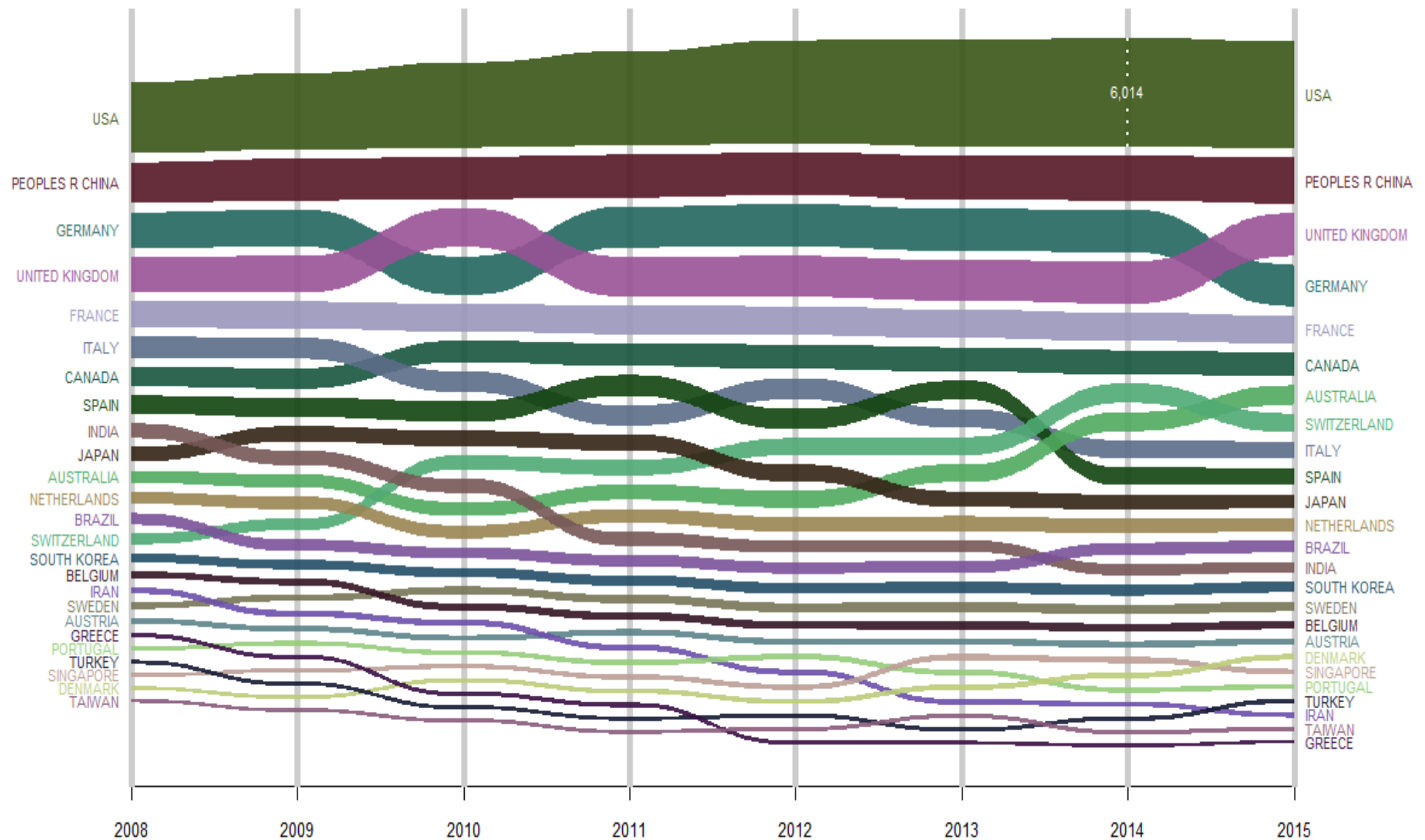
# Main results

Mobility category	Total	% of total	% of mobile	% traveler
Not mobile	15335327	96.3%		
Mobile	595894	3.7%	100.0%	
-- Migrants	162519	1.0%	27.3%	
-- Travelers	433375	2.7%	72.7%	100.0%
---- Directional	213810	1.3%	35.9%	49.3%
---- Non directional	219565	1.4%	36.8%	50.7%
Total	15931221	100.0%		

# Taxonomy of mobile researchers

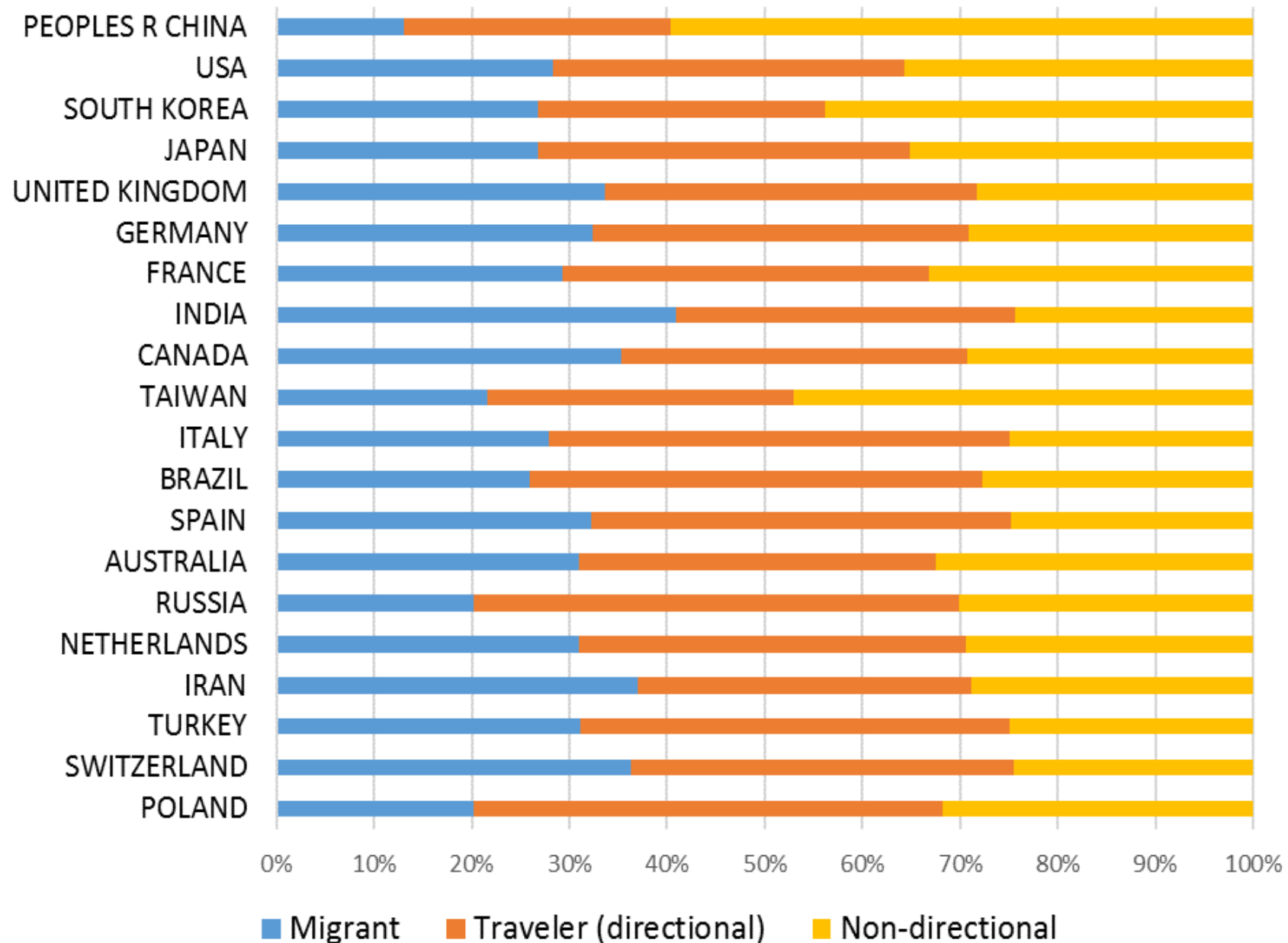


## - increase/decrease affiliations by country

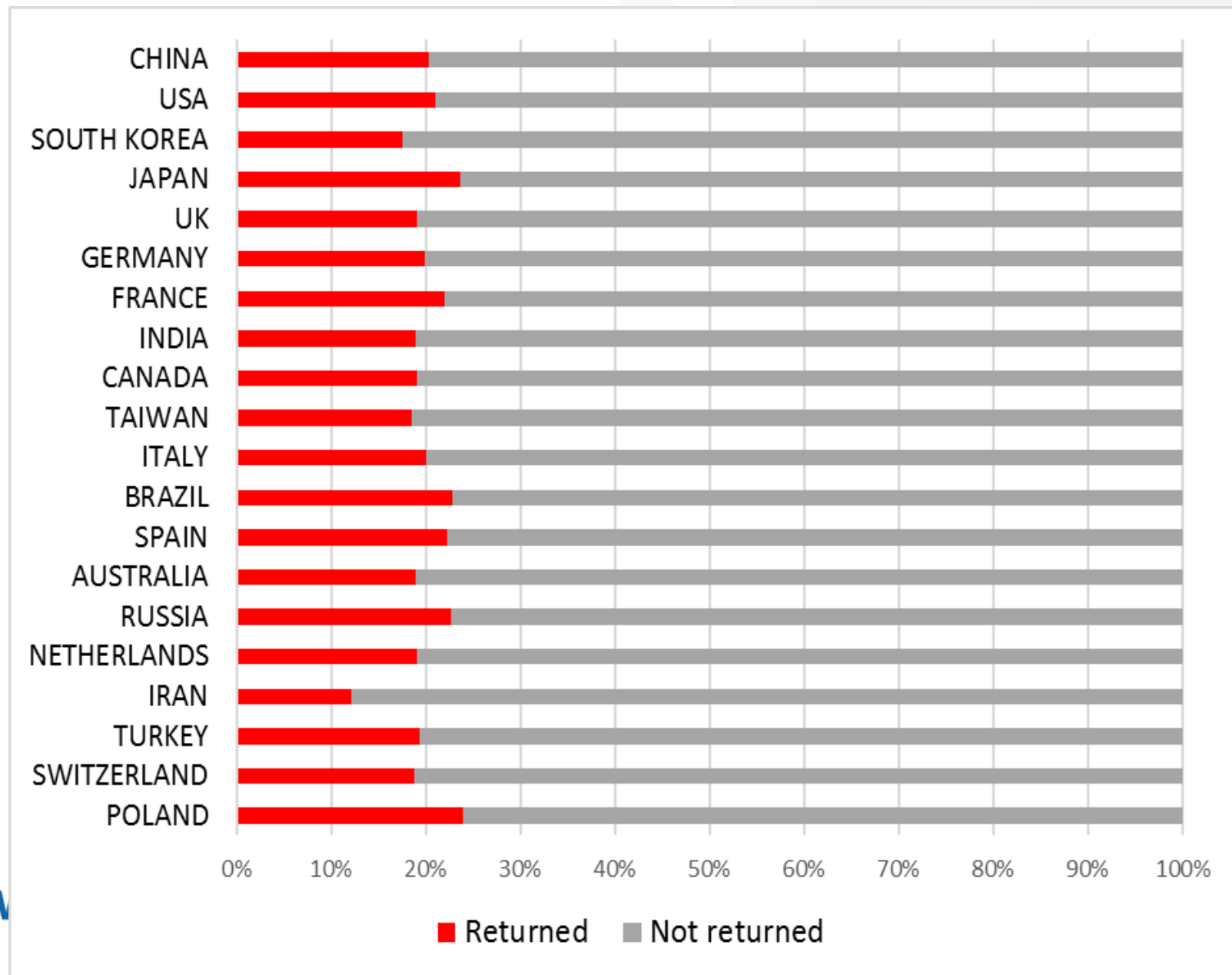




# Proportion of mobile types by country



# Migrants – Returned vs not returned



# Conclusions & further research

- Bibliometrics open a unique window to study mobility patterns
  - Extensive and comparative analysis across countries
  - Identification of multiple forms of mobility
  - Richer analysis of mobility
- Further research should focus:
  - Improvement of the methodologies (author name disambiguation, linkages author-affiliation)
  - Expansion of the taxonomy of mobility and study of the different faces of mobility
    - Combination with other mobility sources (qualitative)
  - Linking bibliometric mobility indicators to policy relevant questions around mobility (brain drain-brain gain, but also more 'fluid' perspectives)

**Merci beaucoup!**

# The 'multiple' faces of mobility

RESEARCHER A			RESEARCHER B		
Year	Country	Pubs	Year	Country	Pubs
0	Greece	2	0	Spain	1
1	Greece	1	1	Spain	3
2	Belgium	1	2	Spain	1
3	Belgium	1	3	United Kingdom	2
3	Greece	2	4	United Kingdom	1
4	Greece	1	5	UK/Italy	1
4	Belgium	1	6	Italy	1
5	United Kingdom	1	7	Italy	3
6	United Kingdom	3			
RESEARCHER C			RESEARCHER D		
Year	Country	Pubs	Year	Country	Pubs
0	Spain	15	0	United Kingdom	3
1	Spain	13	1	United Kingdom	2
2	Germany/Spain	1	1	UK/USA	1
2	Spain	14	2	United Kingdom	3
2	USA/Spain	2	2	UK/USA/Spain	1
3	USA/Spain	7	3	UK/Spain	3
3	USA	5	4	UK/Spain	2
4	USA/Spain	11	5	UK/Spain	3
4	USA	9	6	UK/Spain/France	2



# Towards a taxonomy of mobility types

- Discussion around international scholarly mobility tend to have a linear perspective of mobility
- Not all types of mobility apply to notions such as return, inwards/onwards migration.

1. **International migration** (stock, internationalization, brain drain/gain, 'forced' migration). *Migrants*.

	<i>t0</i>	<i>t1</i>	<i>t2</i>	<i>t3</i>
R1	C1	C2	C3	C1

3. **Fluid mobility** (flow, globalization, multiple affiliation, cosmopolitan scholars). *Travelers*.

	<i>t0</i>	<i>t1</i>	<i>t2</i>	<i>t3</i>
R2	C1/C2	C1	C2	C1*/ C2*/C3

# Limitations

- WoS database:
  - Coverage
  - Data quality and completeness
- Author name disambiguation:
  - Imprecisions
  - Missing publications
  - Conservative approach for mobility (breaks in affiliations may split researchers' outputs)
- Dependency on production!
- Granularity issues:
  - Time (year of first publications, several affiliations overlapping, delays in publication)
  - Country of origin determination

# Advantages

- Relatively standardized and homogeneous framework to discuss mobility across countries
- Identification of multiple types ('faces') of mobility and expansion of the analytical possibilities
- Application of other bibliometric indicators:
  - Citation impact and altmetric indicators
    - Which flows of mobility bring higher impact?
  - Collaboration indicators
    - How are the collaboration networks of mobile scholars? Do they keep ties with their countries of origin?
  - Age of scholars ("year of first publication"), gender, affiliations, etc.
  - Network indicators ("brain sharing", co-affiliation, etc.)