

11-1-2012

International scientific migration analysis generates new insights

Gali Halevi
Elsevier

Henk F. Moed Dr

Follow this and additional works at: <https://www.researchtrends.com/researchtrends>

Recommended Citation

Halevi, Gali and Moed, Henk F. Dr (2012) "International scientific migration analysis generates new insights," *Research Trends*: Vol. 1 : Iss. 31 , Article 5.

Available at: <https://www.researchtrends.com/researchtrends/vol1/iss31/5>

This Article is brought to you for free and open access by Research Trends. It has been accepted for inclusion in Research Trends by an authorized editor of Research Trends. For more information, please contact r.herbert@elsevier.com.

Section 4: Behind the data

International scientific migration analysis generates new insights

Gali Halevi
MLS, PhD and
Dr. Henk F. Moed

Introduction

Scientific networks, collaboration and exchange have been the center of attention in numerous research articles and conferences' discussions. For example, publications on the topic of "brain drain" have grown from 34 in 2000 to over 100 in 2011. The main reason for the increased interest in these topics has been the premise that these types of exchanges benefit scientific progress in that they foster innovation, and enhance and enable the flow of ideas between scientists in different institutions (1), (2), (3). In addition to the actual growth of science and scientific activity, there has been much effort to show that such progress benefits the economy through a line of investigation tying basic research to patents production.

Bibliometrics took a main methodological role in the studies of co-authorship and its results as indicators of collaborative trends by using affiliation information embedded in the bibliographic data of publications. In addition to the ability to track and sketch scientific collaborations between institutions, the availability of author profiles (now also through [ORCID](#)) and their affiliation information in [Scopus™](#) has also made possible the tracking of scientific migration

from country to country (4), (5), (6). Such information is of immense value to our ability to study research migration and use it as a way to inform science policy and track the formation of research excellence centers as they draw domestic and international talent to their doors.

This article describes researchers' migration trends between 17 countries (see [Table 2](#)) and sketches some of its major trends. In addition, it looks at co-authorship patterns and describes the similarities and differences between these two phenomena in order to examine the unique patterns that both these lines of investigation offer and the ways in which each can be used as a way to shed some light on the formation of science excellence in different areas of the world.

The model

In order to study migration patterns, we have defined a specific model for the analysis, in which the move of researchers from one country to another can be more easily tracked. Since bibliometric methods are used, the connection between the theoretical construct and the bibliometric one is specified (see [Table 1](#)).

Theoretical Concept / Interpretation	Bibliometric Constructs
Researcher	Scopus Author ID
Active Researcher	Publishing year
Currently Active Researcher	Publishing in 2011-2012
Researcher starting a scientific career during years 2001-2002	First publication appears in 2001-2002
"Young" researcher in 2011	First publication year >2000
Migrating Researcher (from country A to B)	Publishing author's "work" country changes from A to B

Table 1: Conceptual premises and their bibliometric constructs

D8	EU	BRIC	Other
Egypt	Romania	Brazil	Thailand
Iran	Portugal	China	Australia
Malaysia	Germany	India	Japan
Pakistan	Italy		USA
	Netherlands		
	UK		

Table 2: Countries included in the study

Data

We collected the research output of 17 countries, among which 10 are considered growing countries (noted in red) and 7 are considered as established (noted in blue), from different regions in the world (see Table 2). For each country, the research output for 2000-2012 was collected.

In order to trace the movements of researchers from one country to another, we used the unique Author ID offered by Scopus™ as a way to identify individual authors. In Scopus™, the affiliations associated with an author through their publications are kept and become a part of the unique author profile constructed within Scopus™. This allows for an analysis of migration, as one can identify in which institution and country an author has published. Moreover, the fact that the affiliation is tracked per author allows for a comparison between co-authorship and migration, and enables the distinction between the two as separate indicators of areas of collaboration vs. mobility.

Results: migration towards USA

Using the synchronous approach, analyzing the 2011 publications published by authors from a particular study country and including authors who started their careers from 2001 to 2010, we were able to trace the strengths of migration between various countries. For example, in Figure 1, there are three levels of migration trends to the USA. The strongest migration levels can be seen from countries listed in the inner circle, such as

China, Canada, India, UK, Australia, and others, as denoted in the red lines closest to the center (within the green circle). Moving further away from the center and denoting less migration to the USA are countries such as Iran, Mexico, Singapore, Turkey, Ireland, Poland, and others. Still, one can see clearly that there is a significant amount of migration from these countries, as the middle circle denotes stronger migration than the outer circle, which includes countries such as Malaysia, Pakistan, Hong Kong, Romania and so forth.

Migration versus co-authorship

The connections between geographical areas of collaboration and migration can be clearly viewed by plotting the higher co-authorship / migration ratio countries on a network map. Figure 2 shows links between pairs of countries on the basis of the ratio of the percentage of authors migrating from one country to another and the percentage of co-authorships between the two countries. It only shows links for which this ratio exceeds 1.2. In other words, the map shows which pairs of countries demonstrate a migration relationship that is at least 20% stronger than expected on the basis of their level of co-authorship. In this map, notice the role that China plays as a hub for migration and collaboration between Singapore and Taiwan, connecting them to the USA and the UK. Again, in this map one can see the major countries scientifically engaged with the USA and also attracted to it in terms of migration, such as China, India, Brazil, Japan, UK, but also Iran, Turkey,

Thailand, Romania, Bangladesh, and others. Pockets of migration-collaboration can also be seen between Malaysia - Nigeria and Iraq; Romania - Belgium and Hungary, Italy - Switzerland and Argentina, Iran - Australia, Azerbaijan, Netherlands, UK, Canada, France, Japan and USA.

Discussion

Our study of 17 countries has shown that there is a difference between co-authorship and migration trends. From the data available it is apparent that common language and geographical proximity drive international migration more strongly than it drives co-authorships. In addition, it seems that political tensions do not present a barrier to collaboration and migration when it comes to scientific publications. This can be seen in the relatively high ratio of co-authorship and migration between Iran and the USA, India and Pakistan. There are some interesting patterns in the types of migrations emerging from this line of investigation. Some countries tend to show more temporary migration patterns as researchers move to a different country to complete an academic degree or residency but return to their origin country to continue their career and subsequent publications. This type of migration supports the development of the country's professional skills levels and infrastructure and this type of exchange seems to be increasing. Furthermore, declining patterns of researchers leaving their country on a permanent basis can also be found at the opposite side of the spectrum.

