

Unveiling the determinants of scientific productivity in middle-income countries

Citation for published version (APA):

Rivera León, L. (2021). *Unveiling the determinants of scientific productivity in middle-income countries: an economics of science perspective*. [Doctoral Thesis, Maastricht University]. ProefschriftMaken. <https://doi.org/10.26481/dis.20210610lr>

Document status and date:

Published: 01/01/2021

DOI:

[10.26481/dis.20210610lr](https://doi.org/10.26481/dis.20210610lr)

Document Version:

Publisher's PDF, also known as Version of record

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

www.umlib.nl/taverne-license

Take down policy

If you believe that this document breaches copyright please contact us at:

repository@maastrichtuniversity.nl

providing details and we will investigate your claim.

Impact

Following article 22.5 of the Regulations for obtaining the doctoral degree at Maastricht University, adopted by a decision of the Board of Deans on 13 May 2020, this section discusses this doctoral thesis's scientific and social impact. The impact is discussed in three ways: by presenting first its scientific and social relevance, by explaining the target group to whom the research results are relevant, and by discussing the activities that the research has triggered.

Scientific and social relevance. The main objective of this research is to understand the role of scientists and scientific communities in the process of knowledge creation by looking at scientific productivity, its determinants and effects at the individual level, and the macro level, in the context of Middle-Income Countries (MICs). The thesis results point to a complex picture of determinants for MICs, one where researchers' productivity is influenced by personal characteristics –notably gender and ethnicity, organizational and social structures, scientific collaboration practices, access to foreign knowledge, and international collaboration networks, and their interactions.

The thesis contributes with several key novel scientific and policy insights and methods. It also provides tools for informing policy discussions in the science-policy field in MICs.

Chapter 2 argues for the integration of the network approach to more empirical studies in the economics of science. The Chapter shows that social structure affects scientific collaboration through the use of community detection algorithms in the methodological framework. A measure of social capital is needed in econometric models to have a complete picture of scientific productivity determinants.

Chapters 3 and 4 propose a novel measurement of gender parity impacts. One that is likely to resonate among policymakers concerned in improving national research performance, as it provides a concise and concrete measurement of the costs and benefits of reducing or eliminating gender productivity gaps in science.

The findings of Chapters 2, 3, and 4 point to the risk of segregation of 'minorities' in academic systems. From a research policy perspective, this also signals the need to promote cross-race and cross-gender contacts and diversity in research networks.

The results of the gender chapters 3 and 4 suggest that policy should focus on how to enable equal opportunities for the promotion of women in science and that priority should be given to achieving gender equality in promotion, particularly for black female academics (Chapter 4).

Chapter 5 shows that researchers in MICs that receive their training abroad—often in developed countries with advanced science systems, generate system-wide benefits for their home countries in the form of access to international research networks and act as gatekeepers in transferring this knowledge to their local networks. The results also suggest that policy priority should be given to creating the appropriate conditions to successfully reintegrate researchers back to their home countries, especially given the financial and structural challenges that academic systems in MICs face.

Target group. This thesis has two main target groups. First, academics in the fields of the economics of science, gender economics, and economics of networks will benefit from the methodological contributions and empirical evidence. Second, policymakers in the field of science and research policy will benefit from the policy implications and the social relevance of the research.

More specifically, the empirical chapters also contribute to a better understanding of the functioning and impact of the rating system of researchers of the National Research Foundation (NRF) of South Africa and the National System of Researchers (SNI) of Mexico. As such, policymakers in charge of the management of both programs will find the results relevant for their work, as these suggest further avenues for improvement of both programs and discuss their broader relevance for the academic upgrading and enhancement of scientific productivity of South Africa and Mexico, as well as their impact.

Moreover, the research of Chapter 3, focusing on the micro and macro effects of gender publication productivity gaps in Mexico, was part of the research project "Science, Technology and Innovation Gender Gaps and their Economic Costs in Latin America and the Caribbean", led by the Competitiveness and Innovation Division of the Inter-American Development Bank (IDB) between 2015-2018, and financed by the IDB Gender and Diversity Fund. The results of this research served as input to policy practitioners in the IDB to better understand and measure gender gaps in Science Technology and Innovation (STI) in Latin America and the Caribbean (LAC). The research project

concluded how important it is to integrate the gender dimension in developing and monitoring better public policies in STI in the LAC region.

Activities. The research in this thesis has been highly disseminated in several academic conferences. As such, it benefited from the discussions, comments, and inputs of several scholars and practitioners in STI policy studies.

Preliminary versions of the chapters were presented at the XXXV Sunbelt Conference of the International Network for Social Network Analysis in June 2015 in Brighton, United Kingdom; at the HDCA Conference on Capabilities on the Move in Washington, D.C. (USA) in September 2015; at the Atlanta Conference on Science and Innovation Policy in September 2015 at the Georgia Institute of Technology (USA); at the 9th Model-based Evidence on Innovation and Development (MEIDE) Conference in Moscow, Russia in June 2016; and at the 2016 OECD Blue Sky Forum on Science and Innovation Indicators in Ghent, Belgium.

Chapters 2 and 4 presenting South Africa's results benefited from first-hand extensive discussions and comments at the Workshop on Academic Science in South Africa, in Stellenbosch, in 2016. The workshop aimed to understand how research takes place in South African universities and what could be done to improve their scientific and societal performance. The workshop brought together a small group of European and South African scholars working towards understanding the dynamics of academic science in South Africa. It was co-organized and sponsored by the Centre for Research on Evaluation, Science and Technology (CREST), the Stellenbosch Institute for Advanced Study (STIAS), and the Institut Universitaire de France.

A previous version of Chapter 2 was published as a Conference Paper and presented at the European Meeting on Applied Evolutionary Economics (EMAE) Conference 2015, held in Maastricht, the Netherlands, with the title "Formation and persistence of research communities in Middle-Income Countries: the case of South Africa".

A previous version of Chapter 3 was published as UNU-MERIT Working Paper No. 2016-072, titled "An econometric investigation of the productivity gender gap in Mexican research, and a simulation study of the effects on scientific performance of policy scenarios to promote gender equality". It was also published as an IDB Working Paper in 2017 under the title "Gender Gaps and Scientific Productivity in Middle-Income Countries: Evidence from Mexico".

The research of Chapters 3 and 4 motivated the comparative analysis of gender productivity gaps in France, South Africa, and Mexico, under the leadership of Prof. Dr. Jacques Mairesse. Some

preliminary findings of this comparative research were presented at the 11th MEIDE Conference in Abidjan, Cote d'Ivoire in 2019, with the title "Determinants of the publication productivity gender gap in scientific research: micro-level assessment, macro-level implications, and policy scenarios. Comparing the evidence for Mexico, South Africa and France". The plan is to continue expanding this line of research in the upcoming years.

The gender-ethnicity empirical chapters' results continue to attract broader attention, with media appearances in the newspaper *The Conversation* of the United Kingdom and in the IDB's blog "*Puntos sobre la i*" discussing innovation policy priorities for Latin America and the Caribbean.