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Exploring structural patterns in the uptake of scientific publications in policy-related documents using the Overton altmetrics database: the case of universities in Flanders, Belgium

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Introduction

The performance evaluations of universities and academics are undergoing unprecedented expansion (Mingers & Leydesdorff, 2015; Watermeyer & Hedgecoe, 2016). Scientific impact measurement is no longer exclusively focused on academic recognition, but has broadened to include the quantification of *societal* impact (Bornmann, 2016). At least part of the push away from traditional bibliometric indicators is driven by the need for a more holistic view of scientific excellence, where the *societal impact of university research* (SIUR) is a key concept to achieve multifaceted constructions of scientific excellence (Sivertsen & Meijer, 2020; Smit & Hessels, 2021). Excellence in academia (cf. the established figure of the *hyperprolific author* (Ioannidis, Klavans, & Boyack, 2018)) might not naturally translate into societal impact (Nightingale & Scott, 2007); alternative assessment instruments have been developed in recent years, aimed at extending conceptions of academic excellence.

New metric techniques like *altmetrics* play a key role in capturing non-academic engagement of research in a broad range of sources (Rousseau, Egghe, & Guns, 2018), meant as a complement to traditional indicators (Priem, Taraborelli, Groth, & Neylon, 2011). Just as citations are seen as indicative of a degree of academic recognition, references to scientific publications in non-scholarly sources are seen as indicative of a certain societal recognition they enjoy (Bornmann, Haunschild, & Adams, 2019). However, their partial reliance on social media like Twitter makes them prone to manipulations (Bornmann, 2016) like *academic spamming* (Haustein et al., 2016). References to scientific publications cited in policy documents seem a promising avenue for application in research evaluation (Fang, Dudek, Noyons, & Costas, 2020; Pinheiro, Vignola-Gagné, & Campbell, 2021), as these are presumably more likely to signal a direct SIUR and seem less prone to questionable practices.

Novel databases like Overton[1] allow for detailed analysis of research uptake in more than six million policy-related documents from countries worldwide. But because the ability to measure and analyze citations to academic works in policy documents has only recently become a technical possibility, questions remain as to which and whose research appears in those documents. More research is needed that focuses on unexpected biases these objects might

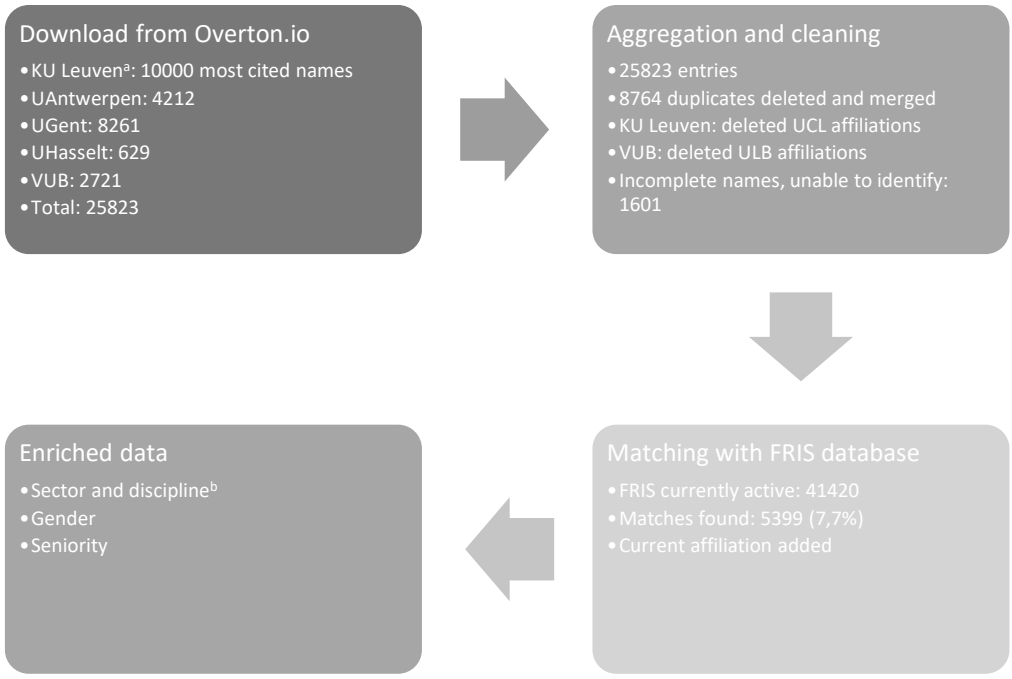
[1] https://www.overton.io/

generate; moreover, gender and seniority of researchers appearing in Overton have not been thoroughly investigated.

The case of five universities: methods and preliminary results

Our data sampling followed four steps (cf. Figure 1). Firstly, during summer 2021, we downloaded lists of researchers from Dutch-speaking universities in Belgium found being cited the most in policy-related documents. Next, we cleaned and aggregated the data, deleting wrong affiliations and merging duplicates. We then matched and identified active researchers using the *Flemish Research Information Space* (FRIS)[2], providing us with actual data on researchers and their research in Flanders, the Dutch-speaking community and region in Belgium. We enriched our dataset with additional gender and seniority data, and academic sector and discipline as well.

Figure 1. Multi-staged data sampling process.



[a] Katholieke Universiteit Leuven (KU Leuven), Universiteit Antwerpen (UAntwerpen) Universiteit Gent (UGent), Universiteit Hasselt (UHasselt), Vrije Universiteit Brussel (VUB).
[b] To define sectors and disciplines, we used the *Flemish Research Discipline Standard* (Vancauwenbergh & Poelmans, 2019).

Out of 41420 active researchers listed in FRIS, 5399 (7,7%) researchers were found with at least one publication being cited in policy-related documents. This is slightly higher than 3,9% Fang et al. (2020) found from querying 18 million Web of Sciences-indexed publications in the Overton database. Descriptive analysis of the sample (n = 5399) shows how male researchers' publications got cited almost twice as many times (63,6%; cf. Table 1) in policy-related documents than their female colleagues (36,4%). Future regression analysis will determine to what extent this relationship is mediated by academic seniority, as Table 1 clearly shows how being cited in policy-related documents is strongly associated with higher levels of seniority. Looking at universities, the two largest universities in terms of personnel (KU Leuven and UGent) represent the largest proportion in cited publications (35,9% and 30,9% respectively).

[2] Vlaamse overheid – Departement Economie, Wetenschap en Innovatie.

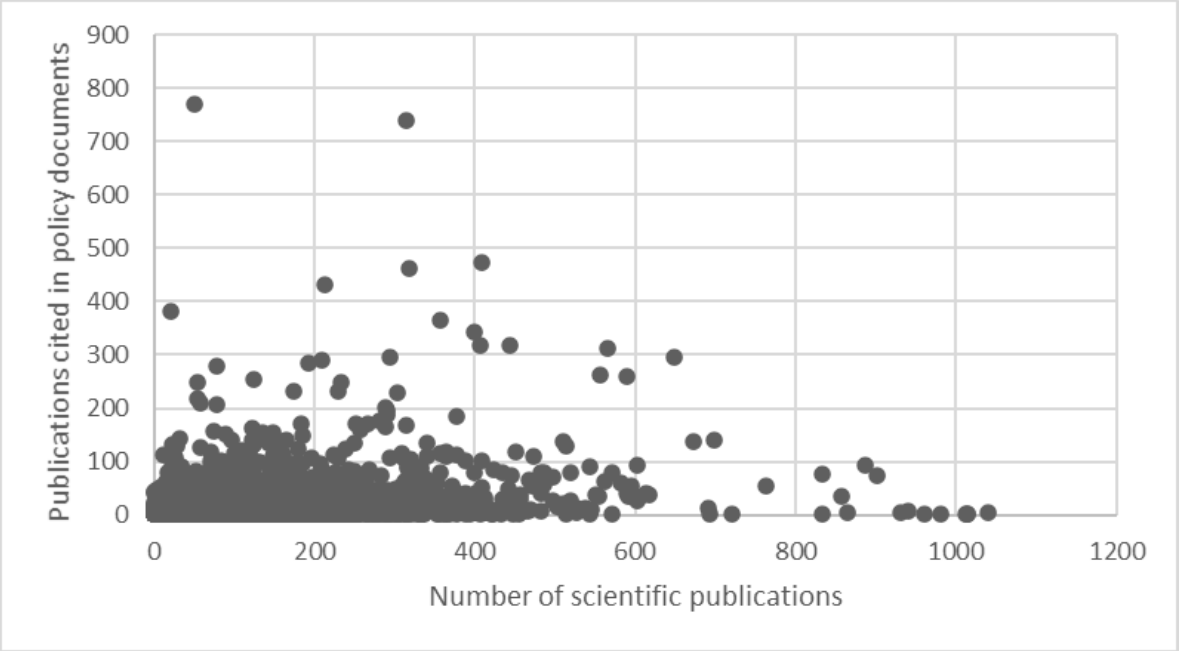
Table 1. Sample of active researchers: publications cited at least once in Overton database.

Sample descriptions (n = 5399)	n	%	M	SD
Gender				
Female	1965	36,4	8,7	18,6
Male	3434	63,6	15,0	37,5
Seniority				
Predoc	729	13,5	4,1	6,6
Postdoc	1087	20,1	6,6	10,4
Professor	2992	55,4	17,5	39,3
Emeritus	239	4,4	22,9	48,0
Other	352	6,5	1,4	0,6
University affiliation[a]				
KU Leuven	1951	36,1	14,6	37,4
UAntwerpen	792	14,7	13,8	35,0
UGent	1666	30,9	12,7	30,5
UHasselt	258	4,8	8,2	21,6
VUB	732	13,6	7,8	14,6

Almost three quarters (74,9%) of researchers' publications were cited ten times or less in policy-related documents; 1,8% were cited 100 times or more, pointing to high skewness in citation distribution. Two professors in economics from KU Leuven form exceptional outliers with 769 and 739 citations in policy-related documents. Publications from Medical and health sciences had the highest concentration of *citedness* (39,7%), followed by Social sciences (30,2%); together they make up for more than two thirds (69,9%) of publications cited in policy-related documents. These results are similar to previous research by Fang et al. (2020). Natural sciences' publications followed with 13,5%; Agricultural, veterinary and food sciences (7,4%) and Engineering and technology (7,3%) were found being cited to a similar extent. Finally, the Humanities and the arts make up 1,0% of publications found being cited in Overton.

Further preliminary analysis shows that the *policy expert* appears as a new type of excellence, contrasting with the hyperprolific author type (cf. Figure 2). Although a positive correlation between scientific publications and publications cited in policy-related documents seems evident (r = .310 (5392), p = < .001), scientific output alone can only be presented as a partial explanation for variance in publications cited in policy-related documents (r^2 = .09, F(1, 5392) = 572.67, p = < .001). Future analysis will focus on regression analysis with policy citations as the dependent variable. Variables gender and university will be incrementally inserted in the model as independent variables, with sector and seniority as covariates. We aim to further map the dissemination of academic research from five universities in a broad set of policy-related documents, and hope to uncover structural patterns in how knowledge from these universities spreads in policy.

Figure 2. Scatterplot showing number of scientific publications and publications cited in policy documents. Each dot represents one active scientist (*n* = 5399).



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