Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Who cites the grant? Grant-number reporting, record linkage and the regional geography of research-funding evaluation in Brazil

Marco Antonio Kerbeg

marcokerbeg1006@gmail.com

Controladoria Regional da União no Estado da Paraíba, Controladoria-Geral da União (CGU)

Flávio Alberti Docha

Banco Central do Brasil

Mathias Schneid Tessmann

Instituto Brasileiro de Ensino

Gustavo Coelho Haase

Banco do Brasil S.A

Research Article

Keywords: Funding acknowledgements, Grant numbers, Record linkage, OpenAlex, Research evaluation, Regional inequality

Posted Date: November 17th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11158070/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Who cites the grant? Grant-number reporting, record linkage and the regional geography of research-funding evaluation in Brazil

Marco Antonio Kerbeg[1], Flávio Alberti Docha[2], Mathias Schneid Tessmann[3], Gustavo Coelho Haase[4]

[1]Controladoria Regional da União no Estado da Paraíba, Controladoria-Geral da União (CGU), João Pessoa, Paraíba, Brazil
[2]Banco Central do Brasil, Brasília, Distrito Federal, Brazil
[3]Instituto Brasileiro de Ensino, Desenvolvimento e Pesquisa (IDP), Brasília, Distrito Federal, Brazil
[4]Banco do Brasil S.A., Brasília, Distrito Federal, Brazil

Corresponding author: Marco Antonio Kerbeg, marcokerbeg1006@gmail.com
ORCID: Marco Antonio Kerbeg 0009-0001-9184-5193; Flávio Alberti Docha 0009-0007-0380-6818; Mathias Schneid Tessmann 0000-0001-9320-0340; Gustavo Coelho Haase 0009-0000-5473-4913

Abstract Funders and evaluators increasingly count the publications that print a grant number in their acknowledgements, and open databases have made this count cheap. Its validity, however, depends on who prints the number. Thus, this paper investigates which grants and which authors become visible when research funding is traced through acknowledged grant numbers. To this end, we collected all 28,491 works that OpenAlex attributes to the Brazilian Innovation Agency (Finep), matched their award codes to the 6,806 grants to universities and research institutes signed in 2004–2021, which Finep publishes, and checked 400 open-access full texts. The results indicate that only 17.6% of the works carry a Finep code and that only 5.7% of the grants are linked to a publication. Within the same journal, authors in the North and Northeast are 14.1 and 8.6 percentage points less likely to report a code than authors in the Southeast, and grants to the North are less often linked: the region received 5.2% of grant value and accounts for 1.4% of linked works once a single network grant, executed in the North but used by researchers elsewhere, is set aside. These findings suggest that evaluations based on acknowledged grant numbers undercount lagging regions.

Keywords Funding acknowledgements · Grant numbers · Record linkage · OpenAlex · Research evaluation · Regional inequality

JEL Classification O38 · I23 · R58 · C81

1 Introduction

Since 2008, the Web of Science has indexed the funding acknowledgements of scientific articles, and in recent years OpenAlex has made funder and award data freely available for a large share of the literature (Paul-Hus et al., 2016; Priem et al., 2022). Funders and analysts have used these data to map sponsorship, to compare funded and unfunded research and to trace publications back to the grants that financed them (Álvarez-Bornstein & Montesi, 2020; Gök et al., 2016; Rigby, 2011, 2013; Wang & Shapira, 2011, 2015). The appeal is obvious: a grant number printed in an article links a public expenditure to a scientific output at almost no cost, and open infrastructures, fed by metadata that publishers deposit with Crossref, promise to do so at scale (Hendricks et al., 2020; Kramer & de Jonge, 2022; Mugabushaka et al., 2022).

The validity of this count, however, rests on two conditions that are seldom tested together. The first is that the grant number is printed and captured in a form that can be matched. Audits of the Web of Science and Scopus have shown that funding information is incomplete, uneven across fields and prone to errors (Álvarez-Bornstein et al., 2017; Grassano et al., 2017; Kokol & Blažun Vošner, 2018; Liu et al., 2020; Tang et al., 2017). The second is that the missing links are missing at random with respect to the question being asked. If reporting varies with the region, size or type of grantee, evaluations based on linked publications are biased, not merely noisy. Most studies can check the first condition only from the side of the publications, because the full set of a funder's grants is rarely public, and the second condition has not, to our knowledge, been examined for a national funder.

Thus, this paper investigates which grants and which authors become visible when research funding is traced through acknowledged grant numbers, using the Brazilian Innovation Agency (Financiadora de Estudos e Projetos, Finep) as a case. Finep is the executive secretariat of the National Fund for Scientific and Technological Development (FNDCT) and publishes every grant it signs with universities and research institutes, with its number, grantee and location (Brazil, 2007; Finep, 2026). To this end, we collected from OpenAlex all 28,491 works that name Finep as a funder, matched their award codes to the 6,806 grants signed in 2004–2021, validated the matches against the location of the authors and examined 400 open-access full texts.

The results indicate that the loss of information is large and selective. Only 17.6% of the works carry a Finep award code, and only 5.7% of the grants are linked to at least one work. Within the same journal, authors in the North and Northeast report a code less often than authors in the Southeast, and grants to institutions in the North are less often linked. Record linkage adds a second, geographic, distortion: grants that fund research networks are signed with one executing institution, while the works they produce come from members across the country, so a single network grant can move the apparent output of a whole region.

Regarding the regional dimension, the question is not incidental. Brazilian science is concentrated in the Southeast, the gap with the North and Northeast has narrowed only slowly (Albuquerque et al., 2002; Chiarini et al., 2014; Sidone et al., 2016), and the law that governs the FNDCT sets a minimum share of its infrastructure resources for institutions in the North, Northeast and Centre-West (Brazil, 1969, 2001). An evaluation that measured the output of grants by linked publications would therefore judge the regional policy with the instrument that most undercounts its beneficiaries. This does not imply that the output of northern grantees is in fact low; it implies that the count cannot tell, which is precisely the problem the responsible-metrics literature warns about (Hicks et al., 2015; Ràfols, 2019).

Regarding the literature, our findings aim to contribute to three strands. For the literature on funding acknowledgements, much of it published in this journal (Álvarez-Bornstein et al., 2017; Liu et al., 2020; Morillo & Álvarez-Bornstein, 2018; Paul-Hus et al., 2016; Rigby, 2013; Wang & Shapira, 2011), we add a funder-side test that compares the full population of grants with the publications that cite them. For the growing use of OpenAlex in research evaluation, assessed in this journal by Culbert et al. (2025) and Zhang et al. (2024), we document the quality of its funder and award metadata for a large funder outside Europe and North America (Alperin et al., 2024; Céspedes et al., 2025). Furthermore, we show that record linkage, a step often treated as technical (Christen, 2012), can by itself reshape the regional picture of research output.

In addition to this introduction, this paper comprises five further sections. Section 2 reviews the literature on funding acknowledgements, open funder metadata and the Brazilian setting. Section 3 describes the data, the linkage rules and the estimation. Section 4 presents the results on reporting, on linkage, on the reliability of the matches and on the regional picture that follows. Section 5 discusses the implications for research evaluation, and Section 6 concludes.

2 Background

2.1 Funding acknowledgements as evaluation data

Acknowledgements record contributions that authorship does not capture, from technical help to financial support (Cronin et al., 2003; Giles & Councill, 2004; Paul-Hus et al., 2017). Their use as a source on research funding predates their systematic indexing. Lewison (1994) and Lewison and Dawson (1998) coded acknowledgements by hand to study the output of European and British biomedical programmes, and Butler (2001) showed how new data sources could change bibliometric assessments. Once the Web of Science began to index funding text in 2008, acknowledgement data were used to describe national funding systems (Huang & Huang, 2018), to compare the impact of funded and unfunded research (Boyack & Jordan, 2011; Thelwall et al., 2023; Yan et al., 2018; Zhao, 2010) and to map the anatomy of funded science (Ma et al., 2015); the presence of acknowledgements itself varies across fields and countries (Costas & van Leeuwen, 2012; Díaz-Faes & Bordons, 2014). Bibliometric indicators, as Moed (2005) argued for citation analysis, are only as reliable as the data from which they are built. The association between funding and citation impact is positive in most fields, but it is mediated by collaboration and varies across disciplines (Álvarez-Bornstein & Bordons, 2021; Thelwall et al., 2023).

A parallel literature, reviewed by Álvarez-Bornstein and Montesi (2020), documents the limits of these data. Funding text was, for years, indexed only for part of the literature (Liu et al., 2020; Paul-Hus et al., 2016; Tang et al., 2017). Funder names appear in many variants, which requires disambiguation (Morillo & Álvarez-Bornstein, 2018), and the recorded information is often incomplete or inaccurate when compared with the full text (Álvarez-Bornstein et al., 2017). Grassano et al. (2017) compared acknowledgement data with funders' own records and documented both gaps and errors, and Kokol and Blažun Vošner (2018) found large discrepancies among databases. Rigby (2011, 2013) warned that counts of acknowledgements are a weak proxy for the effect of funding. The use of acknowledgements to estimate the returns to grants also sits uneasily with the econometric literature, which shows that the effect of funding on productivity is modest once selection is addressed (Jacob & Lefgren, 2011), that the design of funding shapes what is produced (Aagaard et al., 2020;

Azoulay et al., 2011; Wang et al., 2020) and that peer review selects projects on dimensions that only partly predict their output (Li & Agha, 2015).

2.2 Open funder metadata and OpenAlex

OpenAlex indexes works, authors, institutions and funders, and records award identifiers drawn largely from publisher metadata (Hendricks et al., 2020; Priem et al., 2022). Comparisons of bibliographic sources show large differences in coverage (Martín-Martín et al., 2021; Visser et al., 2021), and assessments of OpenAlex find broad coverage of works and references (Culbert et al., 2025) but uneven metadata quality, particularly for institutions, languages and non-English outputs (Alperin et al., 2024; Céspedes et al., 2025; Zhang et al., 2024).

Dimensions pioneered the systematic linkage of grants and publications (Herzog et al., 2020). Studies of funder metadata in open infrastructures report that award identifiers are often missing or incomplete (Kramer & de Jonge, 2022; Mugabushaka et al., 2022). Because the presence of an award identifier depends on what authors write and on what publishers deposit, a missing identifier can reflect either source; we return to this distinction below. Matching award codes to grants is itself a record-linkage problem, with the usual trade-off between false and missed matches (Christen, 2012). None of these studies, to our knowledge, compares the award codes found in publications with the complete public register of a funder's grants.

2.3 Finep, the FNDCT and regional inequality

The FNDCT is Brazil's main federal fund for science, technology and innovation, and its non-reimbursable grants to universities and research institutes are signed and managed by Finep (Brazil, 2007; Melo, 2009; Pacheco, 2007). Evaluations of the fund have focused on its effects on firms (Araújo et al., 2012). Brazilian science is concentrated in the Southeast, and the gap with the North and Northeast, although narrowing, remains large (Albuquerque et al., 2002; Chiarini et al., 2014; Sidone et al., 2016). The law that governs the fund requires that at least 30% of the resources of its infrastructure component go to institutions in the North, Northeast and Centre-West (Brazil, 1969, art. 3º-B, sole paragraph, included by Brazil, 2001, as amended by Brazil, 2007), so the measured output of grants to these regions is directly relevant to policy.

Institutions in lagging regions tend to be smaller and to have fewer administrative staff, which could make them less likely to report grant numbers in a standard form. The fund also finances research networks, which bring together groups from several states under a grant signed with one of them. These features matter for evaluation, because performance-based systems tend to reward institutions that are already visible (Hicks, 2012), citation-based indicators depend on the data used to build them (Waltman, 2016), and counts of outputs capture only part of the value of research (Bornmann, 2013).

3 Data and methods

3.1 Works that acknowledge Finep

We collected from the OpenAlex application programming interface (API), on 24 September 2026, every work with Finep (identifier F4320322904) among its funders: 28,491 works, of which 24,134 are journal articles, 1,147 preprints, 838 dissertations and the rest other types; 85.8% have at least one author affiliated with a Brazilian institution. For each work we kept the award codes that OpenAlex attributes to Finep, the other funders and awards, the publication year and type, the field of its primary topic, the journal and publisher of its primary location, and the institutions of each author. Bulk queries truncate author lists at 100; for the 2,266 works

affected, mostly large collaborations in physics, we retrieved the complete list of authors work by work. We located the Brazilian institutions by the state recorded in OpenAlex or, when missing, by the city, matched to the list of municipalities of the Brazilian Institute of Geography and Statistics (IBGE) when the name is unique (IBGE, 2026); 34 institutions remained without a state. A work is assigned to the region of its first author with a located Brazilian affiliation.

The population of works is itself a product of metadata: a work enters only if OpenAlex records Finep as a funder, which depends on what publishers deposit and on OpenAlex's own processing. Works that thank Finep in a form that is not captured are therefore missing from the denominator. Our estimates of reporting are conditional on this selection, and the full-text check described below, which draws on the same population, examines what happens after a work enters it, not the selection itself.

We classified each award code by its format: Finep grant number (two, two, four and two digits, as in 01.14.0129.01); Finep proposal reference (four digits and a two-digit year, as in 0129/14); the formats of the National Council for Scientific and Technological Development (CNPq; six digits, a year and a check digit) and of the São Paulo Research Foundation (FAPESP; a year, five digits and a check digit); and other formats.

3.2 Finep grants and record linkage

The population of grants comes from Finep's public file of non-reimbursable projects with universities and research institutes, as of 18 September 2026 (Finep, 2026). It lists 9,085 grants with their number, proposal reference, proponent, executing institution and its state, value and dates. The proponent, which signs the grant, is the executing institution in only 32.9% of the grants signed in 2004–2021; in 56.2% of them the proponent is a foundation other than the executing institution, usually a support foundation attached to a university, a share above 44.0% in every region. We use the location of the executing institution throughout. The analysis of grants uses the 6,806 signed in 2004–2021, which had at least four years to produce publications.

Finep grant numbers have four blocks. In the public file each root, formed by the first ten digits, appears only once, and the last two digits change with time: 97.8% of the grants signed in 2024–2026 end in 00, against 20.9% of those signed until 2020. The suffix therefore identifies a version of the same instrument, and authors often cite an earlier version than the one recorded in the file. We normalised every sequence of two, two, four and two digits in the award codes, excluding sequences embedded in longer numbers such as case numbers, and linked works to grants in three ways: an exact match of the grant number; a match on the proposal reference when it identifies a single grant; and a match on the root. We call the union of the three the *main* rule and the exact and reference matches alone the *strict* rule, which serves as a conservative benchmark.

Because the correct grant is unknown, we examine each type of match indirectly: a link to a grant that funds a single group should usually involve at least one author located in the state of the grant's executing institution. The check is imperfect by design, since grants fund collaborations across states, and its failures are informative about where the output of a grant is produced.

To separate authors' omissions from metadata losses, we drew a random sample of works in the life and health sciences with a Brazilian author, published in 2013–2025 and available in open access in Europe PMC (Europe PMC, 2026), and searched the acknowledgement and funding sections of their full text for Finep and for a Finep grant number or proposal reference near the mention.

3.3 Estimation

On the side of works, we estimate linear probability models of reporting a Finep code with indicators for the region of the first Brazilian author (the Southeast as reference) and fixed effects for publication year and field; we then add the work type, the logarithm of the number of authors and an indicator for all-Brazilian teams, and, in turn, fixed effects for the publisher and for the journal, which absorb differences in what publishers deposit. Standard errors are robust to heteroskedasticity, or clustered by publisher or journal in the models with those fixed effects. On the side of grants, we estimate the probability that a grant is linked to at least one work as a function of the region of the executing institution, the logarithm of its value, its duration, its type (commissioned project, infrastructure or other call), the logarithm of the proponent's number of grants, an indicator for grants managed by a support foundation and fixed effects for the year of signature, with errors clustered by proponent. We also compare the regional distribution of grant value with that of linked works (fractionally assigned to grants) and of all works that acknowledge Finep (fractionally assigned to Brazilian author affiliations). The windows differ by purpose: works published in 2008–2025 for the models of reporting, the period in which acknowledgement data are consistently recorded; grants signed in 2004–2021, which had at least four years to produce publications; works published in 2005–2025 for the regional comparison, which matches those grants; and all years from 2000 for the description in Fig. 1. The processed data and the code are provided as Online Resources 1 and 2.

In preparing this study, the authors used the generative AI tool Claude Opus 5.5, developed by Anthropic (version in use in September 2026), to support the search, organisation and verification of bibliographic references, the development and review of the Python scripts used to collect and analyse the data, and the drafting and revision of preliminary versions of the text. The tool did not replace the authors' scientific judgement: the authors defined the research questions, the methods and the interpretation of the results, reviewed all content in full and take full responsibility for it.

4 Results

4.1 How often is the grant number reported?

Of the 28,491 works that acknowledge Finep, 17.6% carry at least one award code attributed to Finep (Table 1). Reporting rose steadily, from 6.8% of works published in 2008–2012 to 30.4% in 2021–2025 (Fig. 1), and varies widely across fields, from 5.7% in physics and astronomy to 45.7% in neuroscience among fields with at least 300 works. Of the 8,349 codes, 42.9% follow the format of Finep grant numbers and 15.0% that of Finep proposal references, while 8.1% follow the CNPq format and 2.1% the FAPESP format: they are awards of other funders attributed to Finep, either by authors who list several grants together or in the processing of acknowledgements. The remaining 31.9% have other formats, including internal codes and truncated numbers.

Table 1 Award codes attributed to Finep in OpenAlex

Indicator	Value
Works with Finep as funder	28,491
Works with a Finep award code (%)	17.6
Works linked to a grant, main rule[a]	3,349
Works linked to a grant, strict rule[a]	1,175
Award codes attributed to Finep	8,349
Finep grant-number format (%)	42.9
Finep proposal-reference format (%)	15.0
CNPq format (%)	8.1
FAPESP format (%)	2.1
Other formats (%)	31.9

Source: OpenAlex (collected on 24 September 2026) and Finep (2026).
[a] Links to any of the 9,085 grants in the public file, signed in any year.

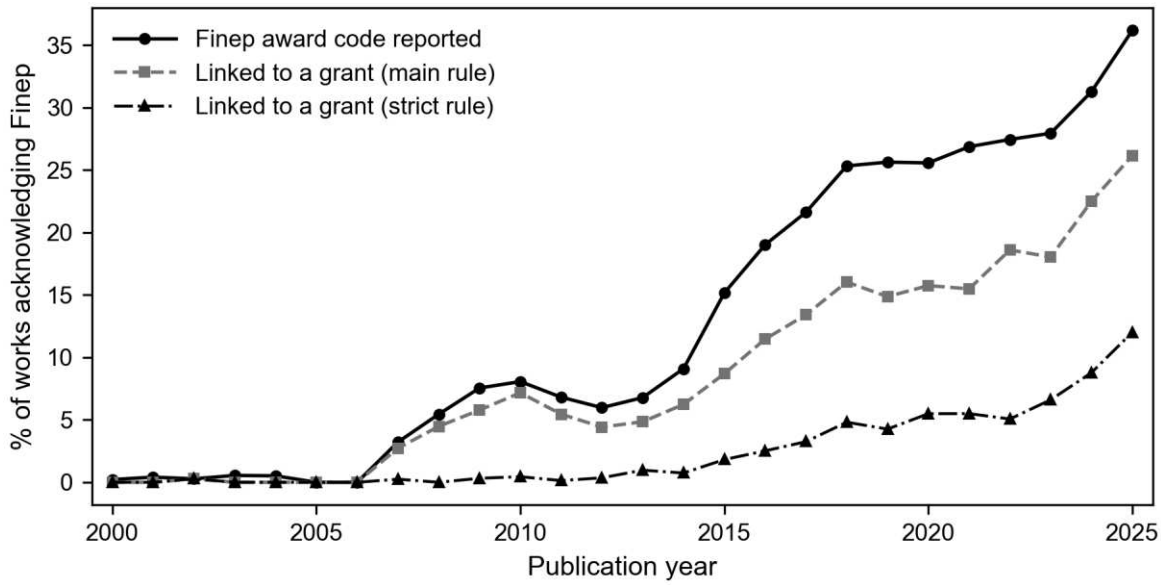


Fig. 1 Share of works acknowledging Finep that report a Finep award code and that are linked to a Finep grant under the main and strict rules, by publication year, 2000–2025

Once field and year are held constant, reporting is lower for authors in lagging regions (Table 2). The raw rates hide this pattern: 26.9% of the works whose first Brazilian author is in the North report a Finep code, against 24.8% in the Southeast, because northern works are concentrated in years and fields with high reporting; the Northeast's raw rate (19.5%) is lower. With fixed effects for year and field only, works from the North, Northeast and Centre-West are 6.8, 8.0 and 6.1 percentage points less likely to report a Finep code than works from the Southeast, against a mean of 23.5%. The gaps widen when work type and team composition are added and remain when publisher or journal fixed effects absorb differences in what publishers deposit: within the same journal, the North is 14.1 points and the Northeast 8.6 points below the Southeast. The gradient is the same among journal articles only, among works whose institutions are located by the state recorded in OpenAlex, and when the number of other awards is controlled for.

Table 2 Reporting of a Finep award code by region of the first Brazilian author, works published in 2008–2025 (linear probability models, percentage points)

Region	(1)	(2)	(3)	(4)	(5)	(6)
North	−6.8 [−10.4, −3.1]	−8.8 [−12.4, −5.2]	−10.4 [−14.8, −6.0]	−14.1 [−18.7, −9.4]	−10.2 [−13.9, −6.4]	−8.5 [−12.2, −4.7]
Northeast	−8.0 [−9.7, −6.3]	−8.9 [−10.6, −7.2]	−8.5 [−11.8, −5.2]	−8.6 [−11.3, −5.9]	−9.0 [−10.8, −7.2]	−8.6 [−10.5, −6.8]
Centre-West	−6.1 [−8.4, −3.8]	−6.7 [−8.9, −4.4]	−6.4 [−9.8, −3.0]	−5.8 [−8.9, −2.6]	−6.9 [−9.3, −4.5]	−5.0 [−7.5, −2.6]
South	−4.4 [−6.0, −2.7]	−4.8 [−6.4, −3.1]	−5.2 [−8.9, −1.5]	−6.8 [−9.8, −3.9]	−5.1 [−6.9, −3.3]	−4.2 [−6.1, −2.4]
Mean (%)	23.5	23.5	24.0	23.9	23.9	24.4
Observations	17,278	17,278	15,680	16,511	15,603	14,539
Obs. (non-singleton)	17,278	17,278	15,512	14,866	15,603	14,539
Fixed effects	Year, field	Year, field, type	+ publisher	+ journal	Year, field	Year, field, type

Note: coefficients relative to the Southeast, with 95% confidence intervals in brackets. Models (2)–(6) also control for the logarithm of the number of authors and an all-Brazilian team. (5): journal articles only. (6): only institutions located by the state recorded in OpenAlex. Standard errors robust to heteroskedasticity in (1), (2), (5) and (6), clustered by publisher in (3) and by journal in (4).

The full-text check separates the two sources of loss. Of the 400 open-access works examined, 39.0% have acknowledgement or funding sections that can be parsed, and 137 mention Finep in them. Only 33.6% of these print a Finep grant number or proposal reference next to the mention: most missing codes are never written by the authors. When a code is printed, OpenAlex records a Finep code for 76.1% of the works, so metadata processing loses about a quarter of the printed codes; codes printed in the text but absent from OpenAlex affect 8.0% of the works that mention Finep. In this subsample, authors whose first Brazilian affiliation is in the North, Northeast or Centre-West print a code about as often as authors in the South and Southeast (36.1%, n = 36, against 32.7%, n = 101). The subsample is small and limited to open-access life and health sciences, so it cannot settle how much of that gap arises when authors write acknowledgements and how much when publishers and indexes process them. It does show that the loss begins with the authors and that metadata processing adds to it.

4.2 Which grants become visible?

Turning from works to grants, the picture is starker. Of the 6,806 grants signed in 2004–2021, 5.7% are linked to at least one work under the main rule and 2.1% under the strict rule; linked grants have a median of 2.0 works. Linkage rises steeply with grant value, from 0.4% in the bottom quartile to 14.0% in the top quartile, and is lowest for grants to institutions in the North (3.0%), against 4.7% in the Northeast, 6.9% in the Centre-West, 6.5% in the Southeast and 5.1% in the South.

The estimates in Table 3 confirm that these differences are not a by-product of grant size or type. Holding year, type, value, duration and the proponent's size constant, grants to North-based institutions are 4.4 percentage points less likely to be linked than those in the Southeast [−6.2, −2.7], against a mean of 5.7%, and grants to the Northeast 2.6 points [−4.3, −0.9]. A tenfold larger grant raises the probability by 1.9 points and each additional year of duration by 1.0 points, while neither the proponent's number of grants nor management by a support foundation matters. Under the strict rule the linkage rate falls to 2.1% and the North coefficient to −2.5 points [−3.4, −1.7]: almost no grant to the North is linked by an exact number or a proposal reference.

Table 3 Probability that a grant is linked to at least one work, FNDCT grants to universities and research institutes signed in 2004–2021 (linear probability models, percentage points)

Variable	Main rule	Strict rule
North	−4.4 [−6.2, −2.7]	−2.5 [−3.4, −1.7]
Northeast	−2.6 [−4.3, −0.9]	−0.9 [−1.9, 0.1]
Centre-West	−0.6 [−2.6, 1.3]	−0.9 [−2.0, 0.1]
South	−1.4 [−3.4, 0.6]	−0.6 [−1.6, 0.4]
Commissioned project	−0.7 [−2.3, 1.0]	−1.5 [−2.2, −0.7]
Infrastructure call	−1.5 [−3.5, 0.4]	−0.1 [−1.3, 1.1]
Log grant value	0.8 [0.1, 1.5]	0.7 [0.4, 1.1]
Duration (years)	1.0 [0.5, 1.6]	−0.1 [−0.4, 0.2]
Log proponent's number of grants	0.3 [−0.2, 0.8]	0.0 [−0.3, 0.3]
Foundation as proponent	1.5 [−0.2, 3.2]	0.8 [−0.1, 1.8]
Mean (%)	5.7	2.1
Grants (proponents)	6,806 (1,001)	6,806 (1,001)

Note: region of the executing institution, relative to the Southeast; type relative to other calls. Fixed effects for the year of signature; 95% confidence intervals from standard errors clustered by proponent. Main rule: exact numbers, proposal references and matches on the first ten digits of the grant number; strict rule: exact numbers and proposal references. Foundation as proponent: the proponent is a foundation other than the executing institution.
Source: OpenAlex and Finep (2026).

4.3 How reliable is the linkage, and where is the output?

Most links come from matches on the root of the grant number, and most of these cite a suffix of 00, the form in which authors usually print the number: 2,112 work-grant pairs with a located Brazilian author and a grant signed in 2004–2021, against 182 exact matches, 624 reference matches and 161 root matches with other suffixes. Because each root identifies a single grant in the public file, these matches point to the right instrument. Where the output of that instrument is produced is another matter. In 90.1% of the exact matches, 91.2% of the reference matches and 91.9% of the other root matches at least one author is in the state of the grant's executing institution, but only in 69.6% of the root matches citing the suffix 00, the form in which grants that fund research networks are usually acknowledged.

The difference is concentrated in the North. For grants executed there, only 18.7% of the linked work-grant pairs involve an author located in the region's executing state, against 81.5% in the Southeast and 84.1% in the South. The largest case explains why. A single grant for the Brazilian Neuroscience Institute network (IBN-Net), signed with a university in the North, is acknowledged by 250 works whose authors are mostly in the South: the grant is correctly identified, but the network's output is produced far from its executing institution. Assigning output to the location of the executing institution, the natural choice for a funder that reports by grant,

therefore moves the apparent output of network grants across regions, and a few such grants can dominate the count for a region with few linked works. Without the IBN-Net grant, 97.1% of the 34 remaining pairs for grants executed in the North involve an author in the executing state, and the share among root matches citing the suffix 00 rises from 69.6% to 76.2%.

The IBN-Net grant is the extreme case, not the only one. In the Northeast, 60.0% of the linked pairs involve an author in the executing state; a large share comes from a grant signed with a university in Bahia (79 pairs, 31.6% in the same state), one of the eight linked commissioned grants of 2006 for multi-site research whose numbers are often cited together: 66 of the 111 works that cite any of them cite at least six. A national research institute's grant in the Southeast shows the same pattern (159 pairs, 39.6% in the same state). Grants that fund networks and multi-site studies are thus a distinct channel through which linked counts misplace output, and their weight in a region's count depends on how many other grants of that region are linked.

4.4 Consequences for evaluation

Table 4 and Fig. 2 compare the regional distribution of grant value with the distribution of all works acknowledging Finep and of linked works. The North received 5.2% of the value of grants signed in 2004–2021 and accounts for 3.0% of the Brazilian authorships of works acknowledging Finep. Under the main rule it accounts for 11.2% of linked works, but the IBN-Net grant alone contributes most of that share: without it, the North's share falls to 1.4%, and under the strict rule it is 0.2%. The count for the region thus swings between overstatement and near invisibility depending on one network grant and on the matching rule. The Northeast shows a more stable but still unfavourable pattern: 14.5% of value, 16.1% of acknowledging authorships and 7.6% of linked works without the network grant.

The Southeast, by contrast, accounts for 56.9% of value and 67.9% of linked works without the network grant. A funder that measured the output of its grants by linked publications would conclude that grants to the Northeast are 2.3 times less productive per unit of value than grants to the Southeast, whereas all acknowledging works suggest the opposite ranking. The comparison does not measure productivity; it shows that the ranking of regions produced by linked publications depends on who prints grant numbers and on where network grants are signed.

Table 4 Regional shares of grant value and of Finep-funded works (%)

Region	Grant value, 2004–2021	All works acknowledging Finep[a]	Linked works, main rule[b]	Linked works, main rule, without the IBN-Net grant[b]	Linked works, strict rule[b]
North	5.2	3.0	11.2	1.4	0.2
Northeast	14.5	16.1	6.8	7.6	7.0
Centre-West	8.8	8.5	8.3	9.2	10.1
Southeast	56.9	50.7	61.2	67.9	65.3
South	14.6	21.7	12.5	13.9	17.4

Note: grant value by region of the executing institution.
[a] Brazilian authorships of works published in 2005–2025, each work split equally across its located Brazilian author affiliations.
[b] Works linked to grants signed in 2004–2021, each work split equally across its linked grants.
Source: OpenAlex and Finep (2026).

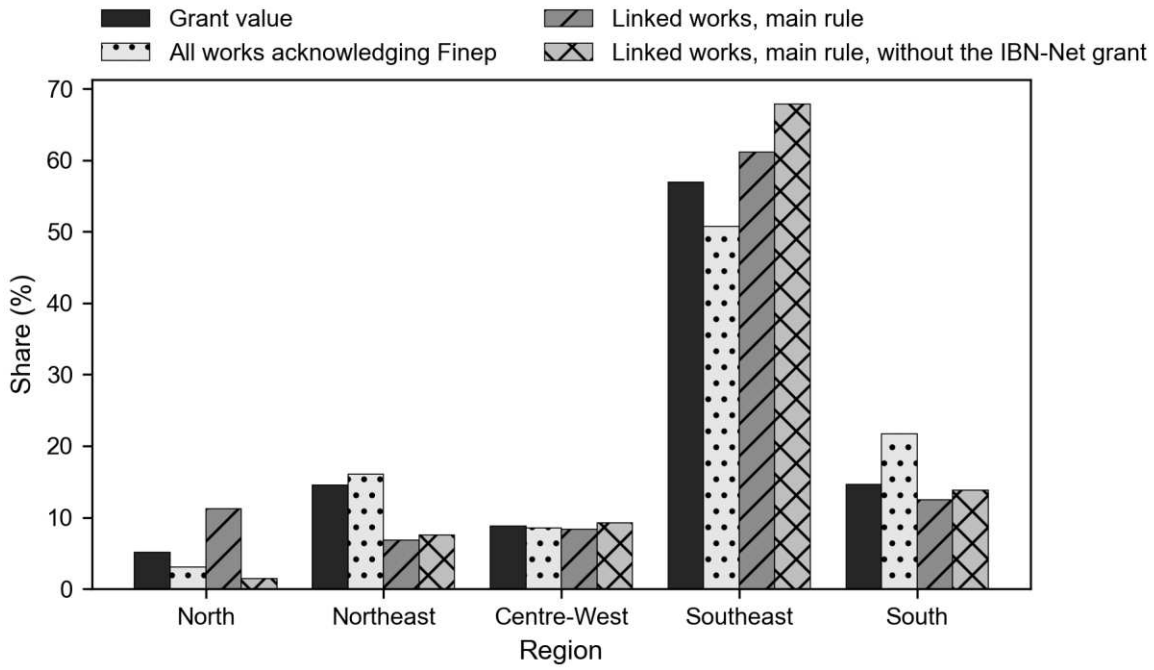


Fig. 2 Regional shares of Finep grant value (2004–2021), of all works acknowledging Finep and of works linked to grants under the main rule, with and without the IBN-Net network grant

5 Discussion

The results show that the loss of information between a grant and the publications it funds is large and selective. Most works that acknowledge Finep do not carry a usable grant number, most grants are not linked to any work, and the missing links are concentrated among grants to institutions in the North and among authors in the North and Northeast. The gradient among works persists within journals, so it does not merely reflect differences between publishers in the deposit of funding metadata, although it may still arise within journals when acknowledgements are processed. The full-text check shows that the loss begins with the authors, since most works that thank Finep print no grant number at all, and that metadata processing adds to it. The pattern is consistent with differences in administrative routines, although our data cannot identify their source: support foundations manage most grants in every region, so their presence alone does not explain the gap.

For research evaluation, the implication is that publication counts based on grant numbers should not be used to compare regions, institutions or programmes without correction. The bias runs in the direction that performance-based systems already favour: towards established institutions in the Southeast (Hicks, 2012; Hicks et al., 2015). Record linkage adds a second problem. Grant numbers identify instruments, not the places where their output is produced, and grants that fund research networks are signed with one executing institution on behalf of groups across the country. Attributing their output to the executing institution can inflate or deflate a region's count, and a single network grant can dominate the picture for a region with few linked works. Evaluations that report output by region should therefore treat network grants separately, and funders could publish the members of each network alongside the grant.

Two measures would reduce these problems. Funders could require a structured grant identifier in acknowledgements and register their grants with persistent identifiers, as Crossref's grant registration allows, so that publishers and indexes can match them without parsing text (Hendricks et al., 2020; Kramer & de Jonge,

2022). And evaluations based on acknowledgements could report coverage by region, institution and grant size, as the responsible-metrics literature recommends for any indicator (Ràfols, 2019). For a fund with a legal regional floor, such reporting is a precondition for assessing whether the floor delivers comparable output.

The analysis has limitations. The population of works is the one OpenAlex attributes to Finep, which misses works whose thanks to Finep are not captured and includes works whose attribution is wrong. The regional assignment of works relies on affiliation metadata, which is incomplete for part of the Brazilian literature. The validation of links by the state of authors is indirect. The full-text check covers only open-access works in the life and health sciences. And the analysis covers only grants to universities and research institutes. None of these limitations explains the regional gradient, which appears on both the side of works and the side of grants.

6 Conclusions

This paper investigated which grants and which authors become visible when research funding is traced through acknowledged grant numbers. To this end, we compared the complete public register of Finep's grants to universities and research institutes with the 28,491 works that OpenAlex attributes to Finep and with a sample of full texts. Only 17.6% of the works carry a Finep code and only 5.7% of the grants signed in 2004–2021 are linked to a publication. Within the same journal, authors in the North and Northeast are 14.1 and 8.6 percentage points less likely to report a Finep code than authors in the Southeast, and grants to the North are less often linked: the region received 5.2% of grant value and accounts for 1.4% of linked works once a single network grant, executed in the North but used by researchers elsewhere, is set aside.

We present these results as evidence on the validity of a widely used indicator, not as estimates of the scientific output of Finep's grants. We did not aim to measure how much each grant produced, and the regional gradient in linked output may combine lower reporting with lower production. The full-text check shows that the loss begins with the authors, most of whom do not print a grant number, and that the processing of acknowledgements adds to it; it covers only open-access works in the life and health sciences and cannot, on its own, apportion the regional gap between authors and metadata.

As a suggestion for future research, the grantee reports that funders collect could be matched to publications to measure the true output of grants and to separate reporting from production. Funders that register their grants with persistent identifiers would make such matching routine, and repeating the exercise for other national funders would show whether the undercounting of lagging regions is specific to Brazil or a general property of acknowledgement-based evaluation.

Statements and Declarations

Funding: No funding was received for conducting this study.

Competing interests: The authors have no competing interests to declare that are relevant to the content of this article.

Ethics approval: Not applicable. The study uses only public, aggregate bibliographic and administrative data.

Data availability: All data used are public. Finep grant data come from the Central de downloads of Finep's transparency portal (files of 18 September 2026); publication data come from the OpenAlex API (collected on

24 September 2026); municipality data come from the IBGE localities API; full texts come from the Europe PMC API. The processed data are provided as Online Resource 1.

Code availability: The Python scripts that collect the data and reproduce all tables and figures are provided as Online Resource 2.

Author contributions: Marco Antonio Kerbeg: Conceptualization, Methodology, Formal analysis, Data curation, Writing – original draft. Flávio Alberti Docha: Conceptualization, Methodology, Writing – original draft, Writing – review & editing. Mathias Schneid Tessmann: Conceptualization, Methodology, Supervision, Writing – review & editing. Gustavo Coelho Haase: Formal analysis, Data curation, Writing – review & editing.

References

Aagaard, K., Kladakis, A., & Nielsen, M. W. (2020). Concentration or dispersal of research funding? *Quantitative Science Studies*, *1*(1), 117–149. https://doi.org/10.1162/qss_a_00002

Albuquerque, E. da M. e, Simões, R., Baessa, A., Campolina, B., & Silva, L. (2002). A distribuição espacial da produção científica e tecnológica brasileira: Uma descrição de estatísticas de produção local de patentes e artigos científicos [The spatial distribution of Brazilian scientific and technological production: A description of local statistics on patents and scientific articles]. *Revista Brasileira de Inovação*, *1*(2), 225–251. https://doi.org/10.20396/rbi.v1i2.8648860

Alperin, J. P., Portenoy, J., Demes, K., Larivière, V., & Haustein, S. (2024). *An analysis of the suitability of OpenAlex for bibliometric analyses* (arXiv:2404.17663). arXiv. https://doi.org/10.48550/arXiv.2404.17663

Álvarez-Bornstein, B., & Bordons, M. (2021). Is funding related to higher research impact? Exploring its relationship and the mediating role of collaboration in several disciplines. *Journal of Informetrics*, *15*(1), 101102. https://doi.org/10.1016/j.joi.2020.101102

Álvarez-Bornstein, B., & Montesi, M. (2020). Funding acknowledgements in scientific publications: A literature review. *Research Evaluation*, *29*(4), 469–488. https://doi.org/10.1093/reseval/rvaa038

Álvarez-Bornstein, B., Morillo, F., & Bordons, M. (2017). Funding acknowledgments in the Web of Science: Completeness and accuracy of collected data. *Scientometrics*, *112*(3), 1793–1812. https://doi.org/10.1007/s11192-017-2453-4

Araújo, B. C., Pianto, D., De Negri, F., Cavalcante, L. R., & Alves, P. (2012). Impactos dos fundos setoriais nas empresas [Impacts of the sectoral funds on firms]. *Revista Brasileira de Inovação*, *11*, 85–112. https://doi.org/10.20396/rbi.v11i0.8649038

Azoulay, P., Graff Zivin, J. S., & Manso, G. (2011). Incentives and creativity: Evidence from the academic life sciences. *The RAND Journal of Economics*, *42*(3), 527–554. https://doi.org/10.1111/j.1756-2171.2011.00140.x

Bornmann, L. (2013). What is societal impact of research and how can it be assessed? A literature survey. *Journal of the American Society for Information Science and Technology*, *64*(2), 217–233. https://doi.org/10.1002/asi.22803

Boyack, K. W., & Jordan, P. (2011). Metrics associated with NIH funding: A high-level view. *Journal of the American Medical Informatics Association*, *18*(4), 423–431. https://doi.org/10.1136/amiajnl-2011-000213

Brazil. (1969). *Decreto-Lei nº 719, de 31 de julho de 1969* [Decree-Law No. 719 of 31 July 1969]. Presidência da República. https://www.planalto.gov.br/ccivil_03/decreto-lei/del0719.htm

Brazil. (2001). *Lei nº 10.197, de 14 de fevereiro de 2001* [Law No. 10,197 of 14 February 2001]. Presidência da República. https://www.planalto.gov.br/ccivil_03/leis/leis_2001/l10197.htm

Brazil. (2007). *Lei nº 11.540, de 12 de novembro de 2007* [Law No. 11,540 of 12 November 2007]. Presidência da República. https://www.planalto.gov.br/ccivil_03/_ato2007-2010/2007/lei/l11540.htm

Butler, L. (2001). Revisiting bibliometric issues using new empirical data. *Research Evaluation*, *10*(1), 59–65. https://doi.org/10.3152/147154401781777141

Céspedes, L., Kozlowski, D., Pradier, C., Sainte-Marie, M. H., Shokida, N. S., Benz, P., Poitras, C., Ninkov, A. B., Ebrahimy, S., Ayeni, P., Filali, S., Li, B., & Larivière, V. (2025). Evaluating the linguistic coverage of OpenAlex: An assessment of metadata accuracy and completeness. *Journal of the Association for Information Science and Technology*, *76*(6), 884–895. https://doi.org/10.1002/asi.24979

Chiarini, T., Oliveira, V. P., & do Couto e Silva Neto, F. C. (2014). Spatial distribution of scientific activities: An exploratory analysis of Brazil, 2000–10. *Science and Public Policy*, *41*(5), 625–640. https://doi.org/10.1093/scipol/sct093

Christen, P. (2012). *Data matching: Concepts and techniques for record linkage, entity resolution, and duplicate detection*. Springer. https://doi.org/10.1007/978-3-642-31164-2

Costas, R., & van Leeuwen, T. N. (2012). Approaching the "reward triangle": General analysis of the presence of funding acknowledgments and "peer interactive communication" in scientific publications. *Journal of the American Society for Information Science and Technology*, *63*(8), 1647–1661. https://doi.org/10.1002/asi.22692

Cronin, B., Shaw, D., & La Barre, K. (2003). A cast of thousands: Coauthorship and subauthorship collaboration in the 20th century as manifested in the scholarly journal literature of psychology and philosophy. *Journal of the American Society for Information Science and Technology*, *54*(9), 855–871. https://doi.org/10.1002/asi.10278

Culbert, J. H., Hobert, A., Jahn, N., Haupka, N., Schmidt, M., Donner, P., & Mayr, P. (2025). Reference coverage analysis of OpenAlex compared to Web of Science and Scopus. *Scientometrics*, *130*(4), 2475–2492. https://doi.org/10.1007/s11192-025-05293-3

Díaz-Faes, A. A., & Bordons, M. (2014). Acknowledgments in scientific publications: Presence in Spanish science and text patterns across disciplines. *Journal of the Association for Information Science and Technology*, *65*(9), 1834–1849. https://doi.org/10.1002/asi.23081

Europe PMC. (2026). *Europe PMC RESTful web service* [Data set]. EMBL-EBI. Retrieved September 24, 2026, from https://www.ebi.ac.uk/europepmc/webservices/rest/

Finep. (2026). *Central de downloads: Contratação* [Download centre: Contracts] [Data set]. Financiadora de Estudos e Projetos. Retrieved September 18, 2026, from https://legacy.finep.gov.br/transparencia-finep/paineis-e-downloads/central-de-downloads

Giles, C. L., & Councill, I. G. (2004). Who gets acknowledged: Measuring scientific contributions through automatic acknowledgment indexing. *Proceedings of the National Academy of Sciences*, *101*(51), 17599–17604. https://doi.org/10.1073/pnas.0407743101

Gök, A., Rigby, J., & Shapira, P. (2016). The impact of research funding on scientific outputs: Evidence from six smaller European countries. *Journal of the Association for Information Science and Technology*, *67*(3), 715–730. https://doi.org/10.1002/asi.23406

Grassano, N., Rotolo, D., Hutton, J., Lang, F., & Hopkins, M. M. (2017). Funding data from publication acknowledgments: Coverage, uses, and limitations. *Journal of the Association for Information Science and Technology*, *68*(4), 999–1017. https://doi.org/10.1002/asi.23737

Hendricks, G., Tkaczyk, D., Lin, J., & Feeney, P. (2020). Crossref: The sustainable source of community-owned scholarly metadata. *Quantitative Science Studies*, *1*(1), 414–427. https://doi.org/10.1162/qss_a_00022

Herzog, C., Hook, D., & Konkiel, S. (2020). Dimensions: Bringing down barriers between scientometricians and data. *Quantitative Science Studies*, *1*(1), 387–395. https://doi.org/10.1162/qss_a_00020

Hicks, D. (2012). Performance-based university research funding systems. *Research Policy*, *41*(2), 251–261. https://doi.org/10.1016/j.respol.2011.09.007

Hicks, D., Wouters, P., Waltman, L., de Rijcke, S., & Rafols, I. (2015). Bibliometrics: The Leiden manifesto for research metrics. *Nature*, *520*(7548), 429–431. https://doi.org/10.1038/520429a

Huang, M. H., & Huang, M. J. (2018). An analysis of global research funding from subject field and funding agencies perspectives in the G9 countries. *Scientometrics*, *115*(2), 833–847. https://doi.org/10.1007/s11192-018-2677-y

IBGE. (2026). *API de localidades: Municípios* [Localities API: Municipalities] [Data set]. Instituto Brasileiro de Geografia e Estatística. Retrieved September 24, 2026, from https://servicodados.ibge.gov.br/api/v1/localidades/municipios

Jacob, B. A., & Lefgren, L. (2011). The impact of research grant funding on scientific productivity. *Journal of Public Economics*, *95*(9–10), 1168–1177. https://doi.org/10.1016/j.jpubeco.2011.05.005

Kokol, P., & Blažun Vošner, H. (2018). Discrepancies among Scopus, Web of Science, and PubMed coverage of funding information in medical journal articles. *Journal of the Medical Library Association*, *106*(1), 81–86. https://doi.org/10.5195/jmla.2018.181

Kramer, B., & de Jonge, H. (2022). The availability and completeness of open funder metadata: Case study for publications funded by the Dutch Research Council. *Quantitative Science Studies*, *3*(3), 583–599. https://doi.org/10.1162/qss_a_00210

Lewison, G. (1994). Publications from the European Community's biotechnology action programme (BAP): Multinationality, acknowledgement of support, and citations. *Scientometrics*, *31*(2), 125–142. https://doi.org/10.1007/BF02018556

Lewison, G., & Dawson, G. (1998). The effect of funding on the outputs of biomedical research. *Scientometrics*, *41*(1–2), 17–27. https://doi.org/10.1007/BF02457963

Li, D., & Agha, L. (2015). Big names or big ideas: Do peer-review panels select the best science proposals? *Science*, *348*(6233), 434–438. https://doi.org/10.1126/science.aaa0185

Liu, W., Tang, L., & Hu, G. (2020). Funding information in Web of Science: An updated overview. *Scientometrics*, *122*(3), 1509–1524. https://doi.org/10.1007/s11192-020-03362-3

Ma, A., Mondragón, R. J., & Latora, V. (2015). Anatomy of funded research in science. *Proceedings of the National Academy of Sciences*, *112*(48), 14760–14765. https://doi.org/10.1073/pnas.1513651112

Martín-Martín, A., Thelwall, M., Orduna-Malea, E., & Delgado López-Cózar, E. (2021). Google Scholar, Microsoft Academic, Scopus, Dimensions, Web of Science, and OpenCitations' COCI: A multidisciplinary comparison of coverage via citations. *Scientometrics*, *126*(1), 871–906. https://doi.org/10.1007/s11192-020-03690-4

Melo, L. M. de. (2009). Financiamento à inovação no Brasil: Análise da aplicação dos recursos do Fundo Nacional de Desenvolvimento Científico e Tecnológico (FNDCT) e da Financiadora de Estudos e Projetos (FINEP) de 1967 a 2006 [Innovation financing in Brazil: An analysis of the use of the resources of the National Fund for Scientific and Technological Development (FNDCT) and of the Financier of Studies and Projects (FINEP) from 1967 to 2006]. *Revista Brasileira de Inovação*, *8*(1), 87–120. https://doi.org/10.20396/rbi.v8i1.8648976

Moed, H. F. (2005). *Citation analysis in research evaluation*. Springer. https://doi.org/10.1007/1-4020-3714-7

Morillo, F., & Álvarez-Bornstein, B. (2018). How to automatically identify major research sponsors selecting keywords from the WoS Funding Agency field. *Scientometrics*, *117*(3), 1755–1770. https://doi.org/10.1007/s11192-018-2947-8

Mugabushaka, A. M., van Eck, N. J., & Waltman, L. (2022). Funding COVID-19 research: Insights from an exploratory analysis using open data infrastructures. *Quantitative Science Studies*, *3*(3), 560–582. https://doi.org/10.1162/qss_a_00212

Pacheco, C. A. (2007). Estratégia para fundos setoriais [A strategy for the sectoral funds]. *Revista Brasileira de Inovação*, *6*(1), 191–223. https://doi.org/10.20396/rbi.v6i1.8648945

Paul-Hus, A., Desrochers, N., & Costas, R. (2016). Characterization, description, and considerations for the use of funding acknowledgement data in Web of Science. *Scientometrics*, *108*(1), 167–182. https://doi.org/10.1007/s11192-016-1953-y

Paul-Hus, A., Mongeon, P., Sainte-Marie, M., & Larivière, V. (2017). The sum of it all: Revealing collaboration patterns by combining authorship and acknowledgements. *Journal of Informetrics*, *11*(1), 80–87. https://doi.org/10.1016/j.joi.2016.11.005

Priem, J., Piwowar, H., & Orr, R. (2022). *OpenAlex: A fully-open index of scholarly works, authors, venues, institutions, and concepts* (arXiv:2205.01833). arXiv. https://doi.org/10.48550/arXiv.2205.01833

Ràfols, I. (2019). S&T indicators in the wild: Contextualization and participation for responsible metrics. *Research Evaluation*, *28*(1), 7–22. https://doi.org/10.1093/reseval/rvy030

Rigby, J. (2011). Systematic grant and funding body acknowledgement data for publications: New dimensions and new controversies for research policy and evaluation. *Research Evaluation*, *20*(5), 365–375. https://doi.org/10.3152/095820211X13164389670392

Rigby, J. (2013). Looking for the impact of peer review: Does count of funding acknowledgements really predict research impact? *Scientometrics*, *94*(1), 57–73. https://doi.org/10.1007/s11192-012-0779-5

Sidone, O. J. G., Haddad, E. A., & Mena-Chalco, J. P. (2016). A ciência nas regiões brasileiras: Evolução da produção e das redes de colaboração científica [Science in the Brazilian regions: Evolution of production and of scientific collaboration networks]. *Transinformação*, *28*(1), 15–32. https://doi.org/10.1590/2318-08892016002800002

Tang, L., Hu, G., & Liu, W. (2017). Funding acknowledgment analysis: Queries and caveats. *Journal of the Association for Information Science and Technology*, *68*(3), 790–794. https://doi.org/10.1002/asi.23713

Thelwall, M., Kousha, K., Abdoli, M., Stuart, E., Makita, M., Font-Julián, C. I., Wilson, P., & Levitt, J. (2023). Is research funding always beneficial? A cross-disciplinary analysis of U.K. research 2014–20. *Quantitative Science Studies*, *4*(2), 501–534. https://doi.org/10.1162/qss_a_00254

Visser, M., van Eck, N. J., & Waltman, L. (2021). Large-scale comparison of bibliographic data sources: Scopus, Web of Science, Dimensions, Crossref, and Microsoft Academic. *Quantitative Science Studies*, *2*(1), 20–41. https://doi.org/10.1162/qss_a_00112

Waltman, L. (2016). A review of the literature on citation impact indicators. *Journal of Informetrics*, *10*(2), 365–391. https://doi.org/10.1016/j.joi.2016.02.007

Wang, J., & Shapira, P. (2011). Funding acknowledgement analysis: An enhanced tool to investigate research sponsorship impacts: The case of nanotechnology. *Scientometrics*, *87*(3), 563–586. https://doi.org/10.1007/s11192-011-0362-5

Wang, J., & Shapira, P. (2015). Is there a relationship between research sponsorship and publication impact? An analysis of funding acknowledgments in nanotechnology papers. *PLOS ONE*, *10*(2), e0117727. https://doi.org/10.1371/journal.pone.0117727

Wang, L., Wang, X., Piro, F. N., & Philipsen, N. J. (2020). The effect of competitive public funding on scientific output: A comparison between China and the EU. *Research Evaluation*, *29*(4), 418–429. https://doi.org/10.1093/reseval/rvaa023

Yan, E., Wu, C., & Song, M. (2018). The funding factor: A cross-disciplinary examination of the association between research funding and citation impact. *Scientometrics*, *115*(1), 369–384. https://doi.org/10.1007/s11192-017-2583-8

Zhang, L., Cao, Z., Shang, Y., Sivertsen, G., & Huang, Y. (2024). Missing institutions in OpenAlex: Possible reasons, implications, and solutions. *Scientometrics*, *129*(10), 5869–5891. https://doi.org/10.1007/s11192-023-04923-y

Zhao, D. (2010). Characteristics and impact of grant-funded research: A case study of the library and information science field. *Scientometrics*, *84*(2), 293–306. https://doi.org/10.1007/s11192-010-0191-y

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- ESM1.xlsx
- ESM2.zip