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Expanding Horizons: The Impact of Post-Doctoral Mobility Grants on Research Diversification

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Abstract

This paper studies whether receiving a post-doctoral mobility grant drives early career researchers to expand the scope of their research by diversifying into new topics. We use data on Marie Skłodowska-Curie Actions Individual Fellowships (MSCA-IF) funded under Horizon 2020 and implement a Regression Discontinuity Design to provide causal evidence. Our results indicate that being awarded MSCA-IF has a positive impact on expanding the breadth of the research portfolio. Funded applicants increase the share of publications with new topics compared to those who are not funded, but only in the years closest to receiving the grant. MSCA-IFs speed up the process of exercising cognitive exploration and intellectual growth, suggesting that they accelerate the process of expanding the scope of research. Our findings contribute to the debate on the role of public funding in shaping research trajectories, fostering intellectual development, and promoting career progress. Policymakers and organizations supporting early career researchers through post-doctoral mobility grants can benefit from these insights to enhance the effectiveness of such programs.

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1. Introduction

As researchers transition from being doctoral students to postdoctoral researchers and eventually full professors, their research strategies evolve throughout their academic lifecycle (Foster et al., 2015; Franzoni & Rossi-Lamastra, 2017; Horlings & Gurney, 2013). During their PhD, most researchers start their intellectual journey by specialising in specific topics under the guidance of their supervisors with whom they gain their initial expertise (Bastalich, 2017; Shibayama et al., 2015). In other words, PhD fellows often become cognitively specialised by performing exploitative research activities. The immediate post-PhD period is when researchers are expected to explore new research areas (Yoshioka-Kobayashi & Shibayama, 2021).[1] During this phase, early career researchers tend to explore various problem areas and topics beyond the scope of their stock of expertise by seeking out new ideas and concepts. This fosters creativity, critical thinking, and problem-solving skills, which are essential components of intellectual capital (Azoulay et al., 2011; Bateman & Hess, 2015; Foster et al., 2015). However, early career researchers may tend to follow the thematic path they established during their doctoral training, perceiving it as a feasible and convenient way to continue their research journey in academia (Shibayama et al., 2015; Yoshioka-Kobayashi & Shibayama, 2021). Laudel and Gläser (2008) emphasise that early career researchers are expected to form distinct research paths by deepening the knowledge acquired during their PhD studies and broadening the scope of their research after their PhD studies. Balancing depth and breadth is crucial at the post-doc career stage (Laudel, 2017), as over-reliance on the expertise acquired during the PhD may confine researchers within the boundaries of their specialised knowledge (Yoshioka-Kobayashi & Shibayama, 2021).

Early career research grants are considered to play an important role for PhD holders to reach intellectual maturity (Science Europe, 2016). The Marie Skłodowska-Curie Actions Individual Fellowships (MSCA-IFs) are the largest of these schemes in Europe, offering career growth and opportunities for knowledge exchange within and beyond Europe.[2] The key objective of the MSCA-IF is to "enhance the creative and innovative potential of experienced researchers, wishing to diversify their individual competence in terms of skill acquisition through advanced training" (European

[1] For instance, Horlings and Gurney (2013) find that doctoral researchers typically focus on a single or a few specific problem areas or topics, often as part of their doctoral dissertation. In contrast, the postdoctoral phase is characterised by diversification, both in terms of research interests and professional connections.

[2] Altogether, a sum of EUR 6.6 billion was earmarked for carrying out the MSCA calls, with the Individual Fellowships programme receiving more than 1.9 billion of the budget and with a 15% success rate (European Commission et al., 2023; European Commission & Directorate-General for Education, 2019).

Commission, 2018, p.13).[3] In addition to the objectives targeting the individual competencies of recipients, there is a strong emphasis on the expectation for the awarded researchers to advance intellectually in their careers.[4] Additionally, "the freedom and flexibility for researchers to pursue their own research agenda" is an important motivating factor to apply for MSCA-IF (European Commission et al., 2023).

In this paper, we study the impact of receiving MSCA-IFs on expanding the research scope of their recipients. Specifically, we investigate whether MSCA-IF recipients are more successful in broadening the scope of their research by diversifying into new topics compared to non-recipients.

We analyse a unique dataset that includes scientists who applied for MSCA-IF between 2014 and 2019 under Horizon 2020, distinguishing between successful applicants and those who did not secure funding. To construct our dataset, we combined information from diverse sources, including MSCA-IF application data from COmmon Research DAta Warehouse (CORDA),[5] and publication data from OpenAlex database. We collected detailed information about all applicants, including their funding status, evaluation scores, scientific outputs, citations, and research topics. The richness of those data allows us to provide evidence on the causal effects of receiving funds on later research topics' diversification. Specifically, we exploited the fine-grained evaluation score assigned to each applicant to implement a quasi-experimental study. In a Regression Discontinuity Design (RDD), we compare 'similar' applicants who are near winners and near misses of the grant.

Our results indicate that MSCA-IF increases early career researchers' possibility and willingness to explore new topics, allowing them to broaden the scope of their research. Funded applicants publish proportionally more in new topics compared to their pre-application research portfolio, relative to similar applicants who were not funded. Specifically, being awarded MSCA-IF increases the share of

[3] *Experienced Researchers* refer to holding a doctoral degree or having at least four years of full-time equivalent experience at the date of the call deadline (European Commission, 2018). Even though *experienced researchers* is used to refer to the applicants within the post-doctoral period (or equivalent work experience) in the official documentation of the work programme, the literature frequently uses the term *early career researchers* to describe junior researchers who are either in the doctoral or post-doctoral phase (e.g., Bol et al., 2018; Wang et al., 2019; Yoshioka-Kobayashi & Shibayama, 2021). For simplicity, we will use *early career researchers* in the rest of this paper to refer post-doctoral researchers who hold a doctoral degree with limited experience.

[4] "Potential of the researcher to reach or re-enforce professional maturity/ independence during the fellowship" is specified as the most important award criteria (European Commission, 2018, p.90).

[5] CORDA is the European Commission's comprehensive database managed by the Directorate-General for Research and Innovation. It integrates administrative details of proposals, project information, and funding/grant data, as well as data related to applicants, beneficiaries, and project outputs.

publications with at least 75% or 90% of new topics by up to 5 and 2 percent points on average, respectively. This effect is observed only two to three years after receiving the grant and disappears over time. The results suggest that MSCA-IF speeds up the process of exercising cognitive exploration and intellectual growth, allowing funded applicants to work on new research topics more quickly. Funded and non-funded applicants experience a similar level of diversification again four years after the funding.

Our paper contributes to the literature on the effects of receiving grants on early career research paths. This literature mainly focuses on the impact of public funding on traditional measures of scientific productivity, such as the amount and quality of scientific output (Arora & Gambardella, 2005; Ayoubi et al., 2019; S. Baruffaldi et al., 2024; S. H. Baruffaldi et al., 2020; Ghirelli et al., 2023; Heyard & Hottenrott, 2021; Non et al., 2022), or the ability of attracting additional funds (Bol et al., 2018; Jacob & Lefgren, 2011a). While the influence of funding on the quantity and quality of output or success in grant competitions holds value for policymakers and scientists alike, those aspects represent just three dimensions of the scientific process (Kelchtermans et al., 2022). In this paper, we look at a fourth dimension: the scientists' research trajectories.

Despite the significance of grants in shaping scientists' research paths, only a few studies have empirically investigated this aspect. Azoulay et al. (2011), for instance, compare recipients of grants funding scientists (by the Howard Hughes Medical Institute - HHMI) and consortia (by the National Institutes of Health - NIH), showing that HHMI provides greater flexibility to recipients. The flexibility provided by HHMI's grants stimulates creativity and leads recipients to explore novel lines of inquiry compared to NIH awardees. Furthermore, Myers (2020) investigates the switching costs of science, focusing on a mission-oriented NIH grant that aims to attract scientists to work on certain topics. He shows that changing the direction of research is costly: scientists expect a significant amount of funding to switch to a topic that is less similar to their existing research line, and that such thematic shifts appear to be only temporary. Similarly, Madsen and Nielsen (2024) compare the shifts in research focus of UK-based researchers who secure mission-oriented grants with those who obtain traditional investigator-initiated grants, where researchers propose the topics to be studied. Although the study finds that mission-oriented grantees change their thematic focus slightly more, both groups of scientists tend to return to the topics they were studying before receiving the grant, supporting Myers' findings on temporary shifts in research direction.

Following Myers' study, Kelchtermans et al. (2022) examine whether funding increases the likelihood of entry into a new field, comparing recipients of a grant from a Belgian research university with those who did not receive it. Using an instrumental variable approach, the study finds no evidence supporting the impact of funding on venturing into unfamiliar research areas. Nevertheless, for scientists already in a new field, Kelchtermans et al. (2022) observe that those with funding tend to make "long jumps". Our work shares a similar spirit with Kelchtermans et al. (2022), who focus on individual grants, but differs both with respect to the empirical strategy, and the contribution. First, we identify the causal impact of receiving funds on the diversification of a recipient's research portfolio in a quasi-experimental setting by comparing 'similar' funded and unfunded applicants. Second, we extend the diversification from a binary interpretation of moving to a new field to diversifying the research portfolio by adding new topics. Third, our focus is on a postdoctoral mobility grant.

Although not the main focus of their study, Baruffaldi and co-authors consider also the relationship between being awarded a grant and exploring new topics (Baruffaldi et al., 2020), and their findings are closely related to ours. They compare funded and nonfunded applicants for a Swiss mobility grant. They find that awarded applicants' post-grant publications rely less on their previous own work. A key conceptual difference from our work is that they assume self-referencing implies continuity in working on the same topics (indicating a low diversification level), while we directly measure the diversification of topics by analysing the content of the research portfolio. Scientists might self-cite their work to boost their visibility. Accordingly, part of the effect that they find may be driven by the fact that awarded applicants experience a reputation gain and reduce self-citations because they become less in need of visibility. Differently from Baruffaldi et al.'s work, we associate topics to publications considering the content of the latter ones, then we directly observe topic changes. The effect we find is, therefore, informative about the diversification dynamics resulting from early career grants. Other important differences are related to the methodology and scope. Baruffaldi et al. focus only on Switzerland, whereas our study encompasses all EU countries and associated countries. Moreover, while both studies employ a fuzzy RDD methodology, our study benefits from access to fine-grain evaluation scores assigned to applicants and a high number of applications, allowing us to create a conservative sample restricted around the funding threshold.

The remaining of the paper is structured as follows: Section 2 provides the related literature about the exploration of new topics, Section 3 illustrates the institutional context for the Marie Skłodowska-Curie Actions Individual Fellowships under Horizon 2020. Section 4 outlines the data sources and

methodology used to measure diversification into new topics. Sections 5 and 6 present our empirical strategy and results, respectively. Lastly, Section 7 concludes and discusses our findings.

2. Exploring new topics

Exploration of new topics is a phenomenon studied both in the sociology and economics of science literature by looking at novelty. In the literature, "novelty" is defined at two levels: for the world and the individual. This paper focuses on the latter aspect, which addresses the exploration of new research topics at the individual level, concentrating on the research portfolio of each scientist separately. We investigate how a researcher changes her own research interests over time. Studies have conceptualised scientists' research strategies in terms of depth versus breadth (Bateman & Hess, 2015; Dahlander et al., 2016; Laudel, 2017; Mannucci & Yong, 2018), specialisation versus diversification (Belkhouja et al., 2021; Franzoni & Rossi-Lamastra, 2017; Leahey, 2006; Nagle & Teodoridis, 2020; Wagner-Dobler, 1997), specialist versus generalist (Åstebro & Thompson, 2011; Kelchtermans et al., 2022; Zuckerman et al., 2003), and exploitative versus explorative behaviors (Bateman & Hess, 2015; Belkhouja & Yoon, 2018; Levinthal & March, 1993; March, 1991). In each dichotomy, the latter concept represents a (potential for) deviation from a scientist's established research path, indicating a change that translates into something "new to the scientist."

For most researchers, it is inevitable to deviate to some extent from the topics they have previously studied (Horlings & Gurney, 2013; Laudel, 2017; Siow, 1998) not only because of the evolving nature of scientific exploration (Franzoni & Rossi-Lamastra, 2017) but also as a risk-reduction strategy that guides scientists away from unproductive areas of research (Hackett, 2005). Additionally, researchers experience further thematic shifts throughout their careers when encountering new opportunities stemming from fresh knowledge and collaborations (S. H. Baruffaldi et al., 2020; Horlings & Gurney, 2013; Shi et al., 2015). According to Laudel (2017, p.342), "thematic change is a ubiquitous phenomenon," and most researchers undergo such a change at least once (Kelchtermans et al., 2022; Laudel, 2017), particularly during their early career phase. Young scholars are expected to exercise intellectual freedom and flexibility in pursuing their own research paths and deviate from the subjects explored under supervision (Laudel, 2017; National Research Council, 2005; Yoshioka-Kobayashi & Shibayama, 2021). Such a departure can occur in various ways, either as a permanent or temporary shift in the thematic focus of one's research or as a radical or incremental deviation from previously

studied research topics. In either case, it leads to a diversification of research topics studied and ultimately expands the scope of the researcher's work.

3. Institutional context

Horizon 2020, the EU's 8th Framework Programme for Research and Technological Development, funded research through its "Excellent Science" programme between 2014 and 2020. The Framework Programme played a key role in addressing global challenges and fostering the emergence of talented researchers in the scientific community. It has even led to two Nobel Prizes being awarded to Anne L'Huillier and Ferenc Krausz in 2023, following 16 other Nobel laureates over the past ten years.[6] Shortly before the launch of the 9th Framework Programme, Horizon Europe, Abbott (2020, p.371) noted, "Horizon 2020 is the world's biggest multinational research programme, having distributed €74 billion (US$90 billion) to more than 150,000 scientists participating in 31,000 projects or grants".

The Marie Skłodowska-Curie Actions (MSCAs) under Horizon 2020 are a flagship programme dedicated to fostering researcher mobility, promoting excellence in research and innovation, and stimulating career development and training. The MSCAs include four main mobility-focused funding schemes: Innovative Training Networks (ITNs), Individual Fellowships (IFs), Research and Innovation Staff Exchange (RISE), and Co-funding of regional, national, and international programmes (COFUND). ITN, RISE, and COFUND require institutional applications, while IF's applicants are individual researchers who submit applications with the support of their respective host institutions (Waele et al., 2021). Between 2014 and 2020, approximately EUR 6.6 billion budget was allocated for MSCA calls under Horizon 2020, with the Individual Fellowships programme receiving over EUR 1.9 billion, and with a success rate of 15% (European Commission et al., 2023; European Commission & Directorate-General for Education, 2019). This latter program represents the ideal empirical setting for our study, as applicants for IFs submit their own proposals. Considering an individual grant, we overcome the limitations due to possible attribution issues encountered when looking at team applications (Jones, 2021).

Marie Skłodowska-Curie Actions Individual Fellowships (MSCA-IFs) are trans-national post-doctoral mobility grants awarded to researchers who wish to work on research projects within and beyond

[6] https://erc.europa.eu/news-events/news/2023-Nobel-physics-prize
https://marie-sklodowska-curie-actions.ec.europa.eu/news/msca-nobel-2023

Europe. The MSCA-IF offers international and intersectoral mobility opportunities to researchers who hold a doctoral degree or have four years of equivalent experience (European Commission, 2018). Unlike most post-doctoral grants, which often have an eligibility window, researchers applying for MSCA-IF are not bound by a specific time limit for application after obtaining their PhD.[7] However, these fellowships are typically awarded to early-career researchers with a doctoral degree (Cavallaro & Lepori, 2021). Individual Fellowships also aim to facilitate the return and reintegration of European researchers (or those with a long-term European residency) from locations outside Europe, as well as promoting the career restart of individual researchers demonstrating significant potential (European Commission, 2018).

The MSCA- IF is categorised into European Fellowships (EFs) and Global Fellowships (GFs). European Fellowships are hosted in EU Member States or Horizon 2020 Associated Countries, welcoming researchers of any nationality to Europe from any part of the world or those moving within Europe, with a duration between 12 and 24 months. Furthermore, Global Fellowships enable European researchers (i.e., either European nationals or long-term European residents) to spend 12 to 24 months on secondment in a non-associated third country, followed by a mandatory 12-month return period to a European host institution. For both European and Global Fellowships, MSCA-IF applications were submitted in the first half of September every year from 2014 to 2020. In order to be considered for funding, researchers were required to submit a proposal of a maximum of 10 pages (excluding their curriculum vitae) and to develop the application in collaboration with their chosen host institution. Applicants were required to apply under one of the eight scientific panels that most closely aligned with the field of expertise covered in their proposal: Chemistry (CHE), Economic Sciences (ECO), Information Science and Engineering (ENG), Environment and Geosciences (ENV), Life Sciences (LIF), Mathematics (MAT), Physics (PHY), and Social Sciences and Humanities (SOC). On average, the MSCA-IF received over 9,300 applications annually across fellowships and disciplines from 2014 to 2020.

Each application is evaluated by three independent reviewers, with a final matching process by MSCA staff to ensure that the chosen reviewers possess the necessary expertise and have no conflicts of interest (Seeber et al., 2021). Reviewers assess each application based on three main awarding criteria:

[7] The Individual Fellowships are restructured under the 9th Programme for Research and Technological Development, Horizon Europe, as the Postdoctoral Fellowships, which require a maximum of eight years of experience in research after obtaining the PhD (European Commission, 2022).

(i) scientific excellence with a 50% weight, (ii) expected impact with a 30% weighting, and (iii) quality and efficiency of the proposed implementation with a weighting of 20% (European Commission, 2014, 2018). Therefore, both the proposal and the CV of applicants are considered for single-blind evaluations, where reviewers have access to the applicant's identity, but not vice versa (Seeber et al., 2021). Applicants are ranked based on a final score scaled from 0 to 100 in each panel and are subject to a threshold of 70. According to the ranking and budget availability under each panel, applications are labelled as 'main,' 'reserve,' 'no money,' or 'rejected' to categorise the funding outcome. On one hand, the highest-ranked applications are labelled with the 'main' status and are awarded. On the other hand, not funded applicants are categorised based on their final score and labelled as either 'reserve', 'no money', or 'rejected'. Highly-ranked applications for which there is not enough money due to budget constraints are assigned to the 'reserve' status. 'No money' refers to the applicants who are eligible since they scored above 70 but are of mediocre quality. Those who cannot meet the threshold of 70 are classified as 'rejected'.

4. Data and sample

4.1 Our data

We analysed data of scientists who applied for MSCA-IF under Horizon 2020, differentiating between those who secured the funding and those who did not. We combined data from the MSCA-IF application in CORDA, with publication data from OpenAlex. From CORDA, we extracted details on all applicants, encompassing funding status, scores, scientific panels (year and scientific field) and observable characteristics like nationality, seniority, and gender. OpenAlex provided information about applicants' scientific outputs, citations, and research topics.

Our initial sample consisted of 48,822 researchers who applied for the MSCA-IF between 2014 and 2020. To assign to each research their publication records, we matched CORDA's information with OpenAlex data. To ensure precise matches between CORDA and OpenAlex, we used various author identifiers such as name, email, ORCID, Scopus ID, and Web of Science ID. We further refined the precision and coverage of our author matches within OpenAlex by conducting additional searches in the Web of Science and Scopus citation indexes and utilising affiliations when available. We developed a procedure to establish high-confidence matches between CORDA and OpenAlex. The procedure prioritises assigning higher confidence levels to unique and specific identifiers like ORCID, compared

to ambiguous ones such as two-word common names. To further improve confidence when matching CORDA and OpenAlex information, records holding multiple author identifiers, such as both ORCID and Scopus ID and name, were assigned even higher confidence levels. To ensure accuracy and consistency, some of the matches were manually verified. As a result, we assigned publications to 35,223 out of 48,822 MSCA-IF applicants with high confidence (72% of our original sample).

Applicants can apply multiple times to MSCA-IFs. Reapplying is more common when applicants are not successful in their previous attempts, however in our data we encountered a few cases where applicants have reapplied after a successful application. In our sample, multiple applicants appear in the following cases: i) all applications are unsuccessful, ii) applications become successful after one or more unsuccessful attempts, iii) applications are successful in their first attempt and not in the subsequent ones, or iv) multiple applications are successful. Only for cases i) and ii) we kept all the observations, while for cases iii) and iv) we kept only the first successful application and dropped the remaining ones. Doing that, we removed 287 observations.[8]

4.2 Our restricted sample: Treatment and control group

Like other grant programs, the allocation of the MSCA-IF grant is not random. The non-random distribution of grants aims to ensure that public funds are allocated to researchers with the highest potential for success to guarantee the most efficient use of resources. For the assignment of MSCA-IFs, each applicant undergoes a comprehensive evaluation in terms of both the content of the proposals and the researchers' overall potential, as detailed in Section 3. Comparing the scientific outputs of funded and unfunded applicants alone may lead to biased results when claiming causality: the applicants of better quality to whom the grant is assigned might be in a better position to explore new topics and collaborate with a greater network of co-authors, even without the grant (Jaffe, 2002; Le & Jaffe, 2017).

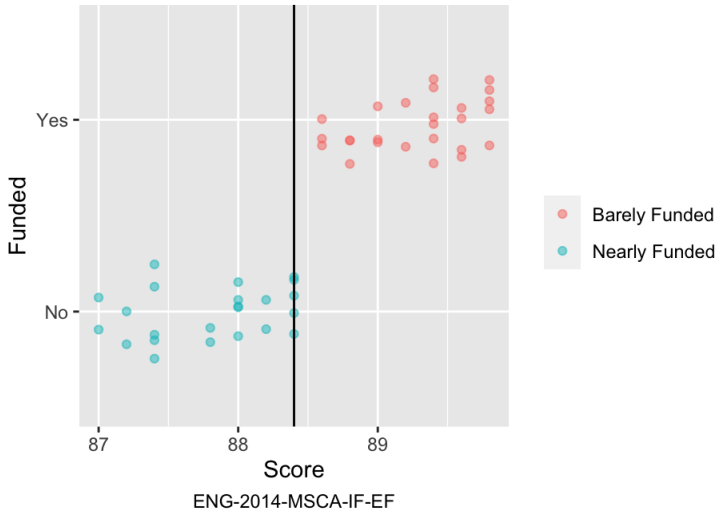
To access the causal impact of the MSCA-IF funding, we follow the research funding impact evaluation literature (e.g., Jacob & Lefgren, 2011a, 2011b; Wang et al., 2019). To identify the control group of non-funded applicants comparable to a treatment group of funded applicants, we focus our analysis on a restricted sample of applicants who were closely ranked just above and below the funding threshold by the evaluation panels. Therefore, our restricted sample consists of applicants who are

[8] Our findings do not change, when we exclude all observations of those applicants who submitted multiple applications.

near winners and near misses of the grant. To do that, we leverage the detailed scores of the evaluation panels. MSCA-IF grants do not rely on a specific fixed threshold for grant success. Instead, applicants undergo a ranking process based on the evaluation score assigned to each individual within each evaluation panel. As a result, the threshold varies from year to year and across different panels depending on applicants' quality and budget availability. To compare similar applicants, we first sort them in ascending order based on their evaluation scores by cohort (panel-year). Next, we identify the highest and lowest score assigned to non-funded applicants within the category "reserve", i.e., the category of applicants with the requisites to be funded but for whom there was not enough budget. The highest score determines the cohort-specific cut-off point, while the absolute difference between the highest and lowest score establishes the interval of the scores assigned. For scores below the cut-off in a given cohort, we subtract this interval to obtain a range of "nearly funded" applicants. We then select all not-funded applicants whose scores fall within this latter range, defining the control group. Conversely, we add the interval of the scores assigned to the cut-off point to obtain a range of "barely funded" applicants. We consider in the treatment group all funded applicants whose scores fall in this range.

To illustrate the construction of control and treatment groups, Figure 1 reports the assignment of applicants to one of the two groups for the cohort 2014 in Information Science and Engineering. The highest and lowest scores within the reserve category for this cohort are 88.4 and 87, respectively. The black vertical line in Figure 1 represents the cut-off point of 88.4, as determined by the highest cohort score. The absolute difference between the highest and lowest scores is 1.4, which is used to establish a restricted area around the cohort's cut-off point. For the range just below the cut-off point, we subtract 1.4 from 88.4 and identify the minimum score of the cohort's restricted sample as 87. All applicants who did not receive funds within this range are assigned to the control group (i.e., the nearly funded group labelled as blue). In contrast, we add the interval 1.4 to 88.4 to determine the range just above the cohort's cut-off. All funded applicants within this range are, therefore, assigned to the treatment group (i.e. the barely funded group, shown in red), where 89.8 represents the maximum score of the cohort's restricted sample. In this example, the cohort's restricted sample consists of 49 observations, 26 of whom are funded and 23 of whom are not funded.

Figure 1. Plotting the 'nearly funded' and 'barely funded' groups



Note: This figure plots the position of applicants in the 2014 Information Science and Engineering cohort of the European Fellowship programme, based on their score and distance from the cohort's cut-off point. The x-axis measures the score variable and the y-axis measures whether an applicant is funded or not. The black vertical line represents the cut-off point of the cohort. Red dots represent the barely funded applicants who are just above the cut-off point (i.e., the treatment group), and blue dots represent nearly funded applicants who are just below the cut-off point (i.e., the control group).

The resulting sample of controls and treated individuals includes 4,292 similar applicants. We then excluded the 2020 cohort of applicants (351 observations) because, for our analysis, we need a 2-year window of publications, and publications for 2022 are not complete as our observation period for publications ended in 2022. We also keep only researchers with at least one publication in the pre-application period and those who have at least one publication with four topics in the post-application period. This last trimming led us to remove a further 1,049 observations. We thus ended up with 2,892 similar applicants, 1,401 funded and 1,491 not funded.

4.3 Variables

Table 1 describes the variables included in our estimations. Our dependent variable is the share of publications that contain at least 75% or at least 90% new topics relative to the applicant's pre-application publications.[9] This share is the proportion of publications with new topics relative to the total number of publications in a given year, and computed by dividing the total number of papers

[9] We classify publications from the year of application and the following year as pre-application period publications, as they likely are the output of work done prior to the application. For instance, a 2014 grantee typically signs project agreements around May 2015, with the project starting in June 2015. Since publishing typically takes over six months, works published during these years are attributed to pre-application activities.

with at least 75% (and 90%) new topics in years *t* by the total number of papers produced in *t*. We identify topics using OpenAlex's hierarchical concepts published in 2022.[10] These topics are machine-coded, building on the method used for Microsoft Academic Graph (Shen et al., 2018). We exclude publications with less than four topics, thus requiring that at least three out of the four topics differ from an applicant's pre-application publications. We compute these shares from the second to the fifth year after application to evaluate if the impact varies over time. We exclude the first year, i.e. publications that were already in progress before the application and may not result from the funded research.

Table 1. Variable descriptions

Variable	Description
Funded	Equal 1 if the applicant has obtained the grant
Year	Year of the call
Panel	The thematic category that the applicant applies under
Score	The score that the applicant has received on a scale from 85.4 to 96.4
Cut-off	Cohort (i.e., panel-and year-) specific cut-off points which are the score of the last non-funded applicant within each cohort
Distance	The distance of the applicant's score from the cohort-specific cut-off point
Duration	Duration of the grant equals 1 if the proposed mobility is 12 months; 2 if it is between 12 - 24 months; and 3 if it is between 24 - 36 months
Female	Equal 1 if the applicant's gender is Female
Country	Nationality of the applicant at the time of application
Academic seniority	The total number of productive years at the time of application (Academic seniority = year of the call – year of the first publication + 1)
Publication history	The number of average yearly publications at the time of application
Citation history	The number of average yearly citations at the time of application
New topics 75% 2 years (3, 4, and 5 years)	The share of publications with at least 75% new topics in 2 (3, 4, and 5) years after the application, compared to pre-application publications
New topics 90% 2 years (3, 4, and 5 years)	The share of publications with at least 90% new topics in 2 (3, 4, and 5) years after the application, compared to pre-application publications

Note: This table describes the variables used in the analysis. It includes the dependent variables measuring the share of publications with 75% and 90% new topics relative to the applicant's pre-application publications. We distinguish between

[10] We specifically focus on OpenAlex's Level 2 Concepts classification which represents the least granular level after the disciplinary classification of Level 0 and 1.

treatment (funded) and control (non-funded) groups using data on funding status, year of call, scientific panel, evaluation score and distance from cohort-specific cut-off points. It includes key variables such as proposed duration of mobility, gender, nationality, academic seniority, publication history and citation history to control for observable characteristics, proposal characteristics, and past productivity.

To distinguish between our treated (funded) and control (non-funded) groups, we use data on funding status, scores, and key proposal features. *Funded* is a binary variable that indicates the funding status of each applicant and equals 1 if the applicant has received the grant and 0 otherwise. *Year* specifies the application year for the grant (i.e., year of the call), and *Panel* identifies the thematic category under which the applicant submits the application. Our thematic categories include Chemistry (CHE), Economic Sciences (ECO), Information Science and Engineering (ENG), Environment and Geosciences (ENV), Life Sciences (LIF), Mathematics (MAT), Physics (PHY), and Social Sciences and Humanities (SOC). *Score* is the evaluation score assigned to each applicant on a scale of 0 to 100. *Duration* indicates the proposed mobility period of each applicant. We constructed a categorial variable that takes the value of 1 when the proposed period is 12 months, the value of 2 when the proposed period is more than 12 months and less than or equal to 24 months, and the value of 3 when the proposed period is more than 24 months and less than or equal to 36 months.

We next control for several observable features of the applicants. The demographic characteristics of the applicants include *Female*, indicated by a dummy variable that takes value 1 for female applicants, and *Country,* which refers to the individuals' nationality. Regarding the characteristics related to the pre-application scientific productivity of the applicants, we consider *Academic seniority* which counts the total number of active years at the time of application, calculated as the difference between the application's year, and the year of first publication; *Publication history*, which indicates the average number of publications produced per year up to the year of application, calculated by dividing the total number of publications by the number of active years at the time of application; and *Citation history*, which considers the average yearly citations received up to the year of application, calculated by dividing the total number of citations by the number of active years at the time of application.

Table 2. Descriptive statistics

	All applicants			Funded applicants			Not funded applicants		
Variable	Obs.	Mean	S.d.	Obs.	Mean	S.d.	Obs.	Mean	S.d.
Funded	2,892	0.48		1,401			1,491		
Score	2,892	91.90	1.62	1,401	92.77	1.49	1,491	91.09	1.27

Cut-off	2,892	91.91	1.19	1,401	91.95	1.20	1,491	91.87	1.17
Distance	2,892	-0.01	1.10	1,401	0.82	0.75	1,491	-0.79	0.74
Female	2,892	0.35	0.48	1,401	0.38	0.48	1,491	0.33	0.47
Academic seniority	2,892	8.23	4.96	1,401	8.24	5.09	1,491	8.21	4.83
Publication history	2,892	3.30	5.04	1,401	3.11	3.34	1,491	3.48	6.23
Citation history	2,892	42.57	123.52	1,401	39.82	117.59	1,491	45.14	128.83
Duration	2,892	24.99	3.98	1,401	24.98	4.00	1,491	25.01	3.97
New topics 75% 2 years	2,892	0.22	0.33	1,401	0.23	0.34	1,491	0.22	0.33
New topics 90% 2 years	2,892	0.08	0.21	1,401	0.078	0.22	1,491	0.077	0.21
New topics 75% 3 years	2,377	0.26	0.31	1,244	0.28	0.32	1,133	0.25	0.30
New topics 90% 3 years	2,377	0.09	0.21	1,244	0.10	0.22	1,133	0.082	0.19
New topics 75% 4 years	1,600	0.29	0.30	849	0.30	0.31	751	0.27	0.29
New topics 90% 4 years	1,600	0.11	0.21	849	0.12	0.23	751	0.09	0.19
New topics 75% 5 years	1,224	0.31	0.30	642	0.33	0.31	582	0.29	0.29
New topics 90% 5 years	1,224	0.12	0.22	642	0.14	0.24	582	0.10	0.19

Note: This table presents summary statistics for the applicants included in our study, distinguishing between those who received funding and those who did not. It shows the number of observations (Obs.), the mean (Mean) and the standard deviation (S.d.) for each variable used in our analyses. The decrease in the number of observations from the 2-years to the 5-years variables is due to data collection in 2022, allowing a shorter observation period for some applicants based on their application year. For instance, the 2-years variable encompasses applicants from 2014 to 2019, while the 5-years variable includes only those from 2014 to 2016.

Table 2 provides an overview of the descriptive statistics for the applicants in our sample, distinguishing between funded and not-funded applicants. The success rate in our sample is 48.44 percent. A success rate near 50 percent and average scores for both funded and not funded groups that are remarkably close (92.77 and 91.09, respectively) are consistent with our strategy of specifically targeting "similar" applicants who are "barely funded" (i.e., near winners) and "nearly funded" (i.e., near misses). The gender distribution shows that the majority of individuals in our sample are males, with the funded group having five percent more female representation than the not-funded group. The sample is predominantly composed of early-career researchers, which is reflected in an average academic seniority of 8 years. In other words, at the time they applied for the grant, an average of eight years had passed since their first publication. At the application time, the applicants had an average of 3.30 publications and received around 43 citations yearly. The average duration of the whole sample corresponds to approximately 25 months of proposed mobility. While the European fellows

tend to propose, on average, about 24 months, the Global fellows intend to stay abroad for about 33 months.

Notably, the "nearly funded" applicants appear to slightly outperform funded ones in terms of both publication and citation history, by producing around twelve percent more publications yearly and receiving over thirteen percent more citations yearly at the time of application. Regarding the main outcome variables, funded applicants appear to publish a slightly higher share of papers with new topics, on average, at both 75% and 90% thresholds, in all periods from two to five years after the application. Interestingly, the difference in means between funded and not funded applicants seems to be slightly larger for the 75% threshold compared to the 90% threshold.

5. Empirical strategy

By following the steps illustrated in Section 4.2, we obtain a suitable sample to investigate the causal impact of MSCA-IF funding on the diversification of applicants' research topics. The rationale behind this is grounded on the premise that applicants just below and just above the cut-off point (i.e., the realized threshold in our case) are expected to be very similar with respect to the evaluation criteria (application and CV). However, those applicants above the cut-off point are funded, and those below the cut-off point are not funded. To further eliminate potential differences, we use a number of controls. We thus compare the share of publications with new topics (75% or 90%) for funded and unfunded researchers, controlling for the quality of grant applications (assigned by the panel, measured as the distance from the cut-off), and observable demographic and scientific productivity characteristics related of the applicants at the time of application. We estimate the following equation using Ordinary Least Squares (OLS):

$$Y_{it+x} = \theta_i + \lambda Funded_{it} + \sigma Distance_{it} + \mu_1 Female_i + \mu_2 \log(\text{Academic seniority})_{it} + \mu_3 \log(\text{Publication history})_{it} + \mu_4 \log(\text{Citation history})_{it} + \mu_5 Duration_{it} + country_i + cohort_{it} + \eta_{it+x} \quad (1)$$

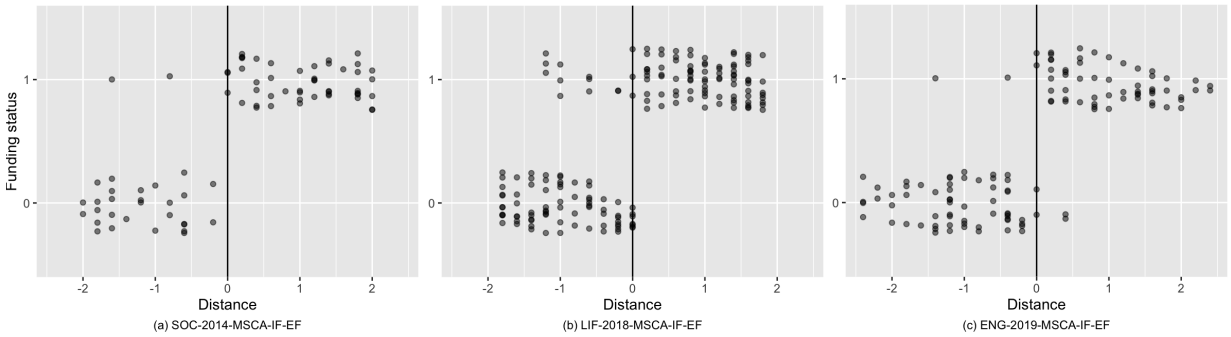
where Y_{it+x} is the share of applicant *i* publications containing at least 75% or 90% new topics *x* years after the application (i.e., New topics 75% or New topics 90% in 2 years, 3 years, 4 years, and 5 years after the application); $Distance_{it}$ is the distance of applicant *i* score from their cohort's cut-off point; $Female_i$ is the applicants' gender (one when the applicant is female); $log(Academic\ seniority)_{it}$ is the logarithm of the applicant's number of years since their first publication; $log(Publication\ history)_{it}$ is the

logarithm of the applicants number of yearly publication before application; $log(Citation\ history)_{it}$ the logarithm of the applicant's number of yearly citations before application; $Duration_{it}$ is the duration of the MSCA they apply for; $country_i$ is the applicant's nationality at time of application; and $cohort_{it}$ are $year_t$X$panel_i$ fixed effects.

Even when controlling for a set of applicant and application characteristics and focusing on a restricted sample around the funding cut-off, estimating the treatment effect using OLS (i.e., equation 1) may still subject to an upward bias if the outcome variable (Y_{it+x}) does not change smoothly with respect to the distance from the cut-off ($Distance_{it}$) – as is likely to be in our case (Lee & Lemieux, 2010). Therefore, we estimate equation (1) using a Regression Discontinuity Design (RDD) (Angrist & Lavy, 1999; Jacob & Lefgren, 2011a, 2011b).

However, our data exhibits a degree of non-compliance (around 6%), resulting in instances where applicants who fall below the cohort-specific cut-off points are still funded and vice versa. Furthermore, there are cases where applicants who receive identical evaluation scores within the same cohort do not consistently receive the same funding outcomes. In other words, applicants with the same scores may or may not receive funding, leading to variability in funding outcomes. Figure 2 illustrates three examples of non-compliance around the cut-off points for three different panel-years. The black vertical lines represent the cohort-specific cut-off points. As the figure shows, there are cases where applicants who received funding had lower evaluation scores than those who did not receive funding (indicated by dots appearing on the upper left-hand side of the cut-off lines) within a particular panel-year, or vice versa. In other words, we see some cases where applicants are in the treatment (or control) group while they are below (or above) the cut-off points in their cohort. Therefore, as our data lacks a clear and sharp discontinuity, we have implemented a fuzzy-RDD.

Figure 2. Plotting the non-compliance around cohort-specific cut-off points



Note: This figure plots examples of non-compliance around the cut-off points for three different cohorts: (a) 2014 European Fellowship applicants in Social Sciences and Humanities; (b) 2018 European Fellowship applicants in Life Sciences; and (c) 2019 European Fellowship applicants in Information Science and Engineering. The x-axis measures the distance variable which indicates the distance of an applicant's score from the cut-off point, while the y-axis measures whether an applicant is funded (as indicated by 1) or not funded (as indicated by 0). The black vertical line represents the cohort-specific cut-off points. Instances where applicants who fall below the cohort-specific cut-off points are still funded (and vice versa) illustrate the non-compliance in our sample.

We use a fuzzy RDD with the following two-stage equation model to evaluate the impact of funding on the share of publications containing at least 75% and 90% new concepts after funding:

First stage:

$$\text{Funded}_{it} = \alpha'_i + \beta' \, I(\text{Score}_{it} > \text{Cut-off}_{it}) + \gamma' \, \text{Distance}_{it} + \delta' \, I(\text{Score}_{it} > \text{Cut-off}_{it})*\text{Distance}_{it} + \omega_1' \, \text{Female}_i + \omega_2' \log(\text{Academic seniority})_{it} + \omega_3' \log(\text{Publication history})_{it} + \omega_4' \log(\text{Citation history})_{it} + \omega_5' \, \text{Duration}_{it} + \text{country}_i + \text{cohort}_{it} + u_{it+x} \quad (2)$$

Second stage:

$$Y_{it+x} = \alpha_i + \beta \, \text{Funded}_{it} + \gamma \, \text{Distance}_{it} + \delta \, I(\text{Score}_{it} > \text{Cut-off}_{it})*\text{Distance}_{it} + \omega_1 \, \text{Female}_i + \omega_2 \log(\text{Academic seniority})_{it} + \omega_3 \log(\text{Publication history})_{it} + \omega_4 \log(\text{Citation history})_{it} + \omega_5 \, \text{Duration}_{it} + \text{country}_i + \text{cohort}_{it} + \varepsilon_{it+x} \quad (3)$$

In the first stage (i.e., equation 2), we estimate the probability of being funded, employing a set of control variables and including fixed effects to account for unobserved trends. Accordingly, $I(Score_{it} > Cut\text{-}off_{it})$ serves as an instrument for being funded and takes the value of 1 when the applicant's score is above the cohort-specific cut-off point. $Distance_{it}$ shows the distance of applicant i's score from their cohort's cut-off point. We use the same controls as in Equation (1).

In the second stage (i.e., equation 3), we use the estimated funding variable ($Funded_{it}$) and, therefore, the coefficient of interest β represents the causal impact associated with receiving the grant. The rest of the equation remains the same, including control variables and fixed effects. Our main outcome variable Y_{it+x} is either New topics 75% or New topics 90% x years after the application, therefore, 2 years, 3 years, 4 years, and 5 years after the application.

6. Results

In this section, we present the OLS (Table 3) and RDD (Table 4) estimation results on the impact of MSCA-IF funding on the share of publications with at least 75% and 90% new topics, relative to the applicant's pre-grant research portfolio. In both Tables 3 and 4, odd columns (1, 3, 5, 7, 9, 11, 13, and 15) show the results of our estimations without fixed effects, whereas even columns (2, 4, 6, 8, 10, 12, 14, and 16) include country and cohort fixed-effects.

Table 3 suggests a positive association between receiving the grant and diversifying into new topics. The share of publications with at least 75% new topics (with respect to their pre-application publications) is, on average, three percentage points (pp) higher for funded applicants (see columns 1, 3 and 4 in Table 3). The association is statistically present but relatively weak 2 years after the application outcome when fixed effects are excluded, while the difference between the funded and not funded applicants disappears when we introduce country and cohort fixed effects. The coefficient of interest remains positive, with modest statistical significance across both models 3 years following the application. However, the difference between funded and not funded applicants disappears in all models for the 4 and 5 years after the application outcomes (columns 5-8 in Table 3). When the outcome variables indicate the share of publications with at least 90% new topics, the difference between funded and not funded applicants remains positive and significant only 3 years after the application. The share of publications with at least 90% new topics is around 2pp higher for funded applicants (columns 11 and 12 in Table 3). Overall, the OLS results suggest that receiving an MSCA-IF increases the likelihood of diversifying into new topics, yet the positive association appears modest and temporary.

Results are largely confirmed in the RDD setting. Table A.1 in the appendix presents the first-stage regression results for our main models (i.e., the first model that excludes fixed effects in columns 1, 3, 5, and 7; and the second model that includes country and cohort fixed-effects in columns 2, 4, 6, and 8 in Table A.1). The coefficient of I(Score > cut-off) is highly significant across all models, indicating the validity of our instrument, i.e., it is a robust instrument in predicting the probability of being funded. Among the control variables, only the gender variable has a positive association in all models, suggesting that being female increases the likelihood of being funded. The results reported in Table 4 show that the coefficients are slightly larger in the RDD setting, confirming that OLS results are

slightly downward biased.[11] The second-stage regression results for the fuzzy RDD indicate that funded applicants tend to publish a higher share of papers focusing on new topics compared to their pre-application research portfolio for both thresholds (75% or 90%). Regarding the 75% threshold, statistically significant and positive results are present only 3 years after the application when fixed effects are introduced (see column 4 in Table 4). Additionally, the coefficient increases in magnitude after including the country and cohort fixed effects, becoming statistically significant, though only at a marginal level. However, the coefficient of interest becomes insignificant and decreases in magnitude in all models for 4 to 5 years after receiving the grant (columns 5-8 in Table 4). In other words, the positive impact of being funded disappears over time. The control variables show that we do not observe a gender bias and the probability of publishing a higher share of papers containing at least 75% of new topics is negatively correlated with academic seniority, publication history, and citation history in all years, suggesting some expected path dependence for more experienced and specialised researchers. Considering academic seniority, these results are consistent with previous studies that found a negative correlation between age and creativity (Jones, 2010; Packalen & Bhattacharya, 2019). Looking at the citation history, also Zeng et al. (2019) suggest that researchers with lower citation impact are more likely to change their research focus. In other words, scientists who have not received as much recognition for their work may be more inclined to explore different topics in their research.

Regarding the 90% threshold, the positive and statistically significant results hold for 3 years after the application in both models (column 11 and 12 in Table 4). Increasing the threshold to 90% extends the positive and statistically significant difference between the funded and not funded to 4 years after the application. This difference disappears again over time, starting later this time (i.e., starting after the 4th year mark; see columns 15 and 16 in Table 4). Compared to the OLS results, the fuzzy RDD predicts a longer and higher impact of being funded, suggesting that the OLS results are also biased downward at the 90% threshold outcomes.

When the threshold is set to 90%, the results suggest a longer and higher impact of being funded compared to the 75% threshold. This suggests that the relationship between funding and moving to new research topics might be linear or even amplified as the threshold increases. Notably, introducing 90% new topics in a paper typically means introducing entirely new topics in our context. Among

[11] The coefficients are slightly larger in the RDD setting except for share of papers with at least 75% new topics in 2 years after the application outcome (columns 1 and 2 in Table 4).

applicants in the restricted sample, 90% of papers classified as having at least 90% new topics actually introduce a complete set of new topics. For example, if a paper is categorized as having new topics and contains 4 topics, all 4 topics are entirely new in 90% of these papers. This pattern holds for papers with up to 18 topics, where all 18 topics are new.

These findings imply that the MSCA-IFs allow researchers to explore almost entirely new topics, which are often unrelated to the topics of their pre-application research. The stronger effect observed at the 90% threshold highlights the crucial role of funding in facilitating a high degree of topic diversification. In contrast, the diminished effect at the 75% threshold suggests moderate diversification (up to 75%) is relatively easier to achieve, even for those without MSCA funding. This further suggests that while non-funded researchers can manage moderate diversification, transitioning to entirely new topics (90% or more) is significantly more challenging without the necessary financial resources.

To address whether applicants who were already diversifying before the grant are more likely to continue diversifying afterward, regardless of receiving the MSCA fellowship, we control for pre-diversification in our analysis (see Table A.2). The control variable "pre-diversification", defined as the average number of unique topics per pre-grant publication, captures each researcher's prior tendency to explore new topics. Including this control in our fuzzy RDD model shows that prior diversification history does not influence the likelihood of receiving the grant for applicants from the 2014–2019 period. Notably, excluding the 2019 cohort does not change the results. However, when we remove the 2018 and 2017 cohorts, the first-stage results indicate a modest association between higher prior diversification and the likelihood of being awarded the grant (columns 3 and 4 in Table A.2).

While pre-diversification might have influenced grant decisions for certain cohorts, this potential preference does not seem to affect post-grant diversification tendencies. For instance, the positive impact of receiving the MSCA grant on diversification is modestly significant for publications with at least 75% new topics 3 years after the application, with no significant association with the pre-diversification control (see column 6 in Table A.2). This indicates that, regardless of whether applicants were selected based on pre-diversification, it does not influence their tendency to diversify their research at the 75% threshold afterward. However, at the 90% threshold, receiving the grant significantly increases the share of papers with at least 90% new topics in 3 and 4 years after the

application, with a negative and statistically significant coefficient for pre-diversification (see columns 10 and 11 in Table A.2). By years 2 and 5, pre-diversification remains a negative predictor of exploring new topics, though the grant itself no longer differentiates between funded and non-funded applicants (see columns 9 and 12 in Table A.2). The negative significant coefficient for pre-diversification, relative to share of papers with almost entirely new topics (90% or more), suggests that applicants with a narrower initial focus are more likely to broaden their research scope post-application. Consequently, those with less initial diversification may find it easier to introduce new topics into their research portfolio.

As previously outlined in the Empirical Strategy section (i.e., Section 5), Figure 2 illustrates the non-compliance around the cut-off points across different cohorts. Overall, our restricted sample indicates a non-compliance rate of 6%, resulting in instances where applicants who fall below the cohort-specific cut-off points are still funded, or vice versa. To consider these exceptions, we also perform an analysis with full compliance by excluding non-compliant applicants, comparing funded and non-funded individuals in a sharp RDD setting for the 75% and 90% new topics outcomes. The results (Table A.3) show that, at the 75% threshold, the findings remain consistent regardless of whether non-compliant applicants are included or whether a fuzzy or sharp RDD is implemented. However, at the 90% threshold, the sharp RDD results indicate a stronger impact of being funded, with the difference becoming statistically significant at a higher level (columns 11–14 in Table A.3). This suggests that non-compliance in the fuzzy RDD introduces some noise, slightly reducing the precision of the estimates. Nevertheless, the consistent findings across approaches confirm the robustness of the funding effect on topic diversification.

Table 3. OLS results on the share of publications with new topics

	New topics 75%								New topics 90%							
	2 years		3 years		4 years		5 years		2 years		3 years		4 years		5 years	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Funded	0.029*	0.026	0.029*	0.031*	0.011	0.005	0.011	0.011	0.015	0.012	0.025**	0.023*	0.020	0.022	0.006	0.015
	(0.017)	(0.018)	(0.017)	(0.018)	(0.021)	(0.022)	(0.023)	(0.024)	(0.011)	(0.012)	(0.012)	(0.012)	(0.015)	(0.016)	(0.018)	(0.019)
Distance	-0.014*	-0.013	-0.003	-0.002	0.019	0.025	0.020	0.023	-0.011**	-0.007	-0.005	-0.002	0.003	0.007	0.019	0.018
	(0.008)	(0.008)	(0.008)	(0.009)	(0.015)	(0.016)	(0.016)	(0.017)	(0.005)	(0.005)	(0.006)	(0.006)	(0.011)	(0.012)	(0.012)	(0.013)
Female	0.016	0.008	0.003	-0.007	0.024*	0.023	0.037**	0.033*	0.021**	0.017*	0.001	-0.007	0.011	0.009	0.030**	0.030**
	(0.012)	(0.014)	(0.013)	(0.014)	(0.014)	(0.016)	(0.016)	(0.018)	(0.008)	(0.009)	(0.009)	(0.010)	(0.011)	(0.012)	(0.012)	(0.014)
log(Academic seniority)	-0.040***	-0.047***	-0.047***	-0.050***	-0.049***	-0.051***	-0.055***	-0.047**	-0.019**	-0.020**	-0.017*	-0.019*	-0.026**	-0.025**	-0.016	-0.006
	(0.013)	(0.014)	(0.013)	(0.014)	(0.015)	(0.017)	(0.017)	(0.019)	(0.009)	(0.009)	(0.009)	(0.010)	(0.011)	(0.012)	(0.013)	(0.014)
log(Publication history)	-0.115***	-0.110***	-0.157***	-0.154***	-0.163***	-0.156***	-0.173***	-0.163***	-0.044***	-0.046***	-0.067***	-0.066***	-0.083***	-0.076***	-0.087***	-0.072***
	(0.015)	(0.017)	(0.016)	(0.018)	(0.019)	(0.022)	(0.020)	(0.024)	(0.010)	(0.011)	(0.011)	(0.013)	(0.014)	(0.016)	(0.015)	(0.018)
log(Citation history)	-0.043***	-0.036***	-0.039***	-0.026***	-0.045***	-0.034***	-0.046***	-0.037***	-0.023***	-0.018***	-0.025***	-0.020***	-0.024***	-0.024***	-0.028***	-0.033***
	(0.007)	(0.008)	(0.007)	(0.008)	(0.007)	(0.010)	(0.008)	(0.011)	(0.004)	(0.005)	(0.005)	(0.006)	(0.005)	(0.007)	(0.006)	(0.008)
Duration	0.007	-0.027	-0.005	-0.035	0.028	-0.018	0.013	-0.010	-0.005	-0.013	-0.016	-0.043*	-0.007	-0.016	-0.014	-0.042
	(0.018)	(0.039)	(0.018)	(0.037)	(0.022)	(0.048)	(0.025)	(0.051)	(0.012)	(0.026)	(0.013)	(0.026)	(0.017)	(0.036)	(0.019)	(0.039)
Country FE		x		x		x		x		x		x		x		x
Years X Panel FE		x		x		x		x		x		x		x		x
Observations	2,892	2,892	2,377	2,377	1,600	1,600	1,224	1,224	2,892	2,892	2,377	2,377	1,600	1,600	1,224	1,224
R-squared	0.112	0.182	0.158	0.237	0.201	0.297	0.235	0.332	0.061	0.138	0.088	0.169	0.111	0.214	0.137	0.252
F-test	52.15	2.68	63.40	3.33	57.14	3.58	53.51	3.61	26.97	1.93	32.53	2.18	28.48	2.31	27.55	2.45

Robust Standard Errors in Parentheses | *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Note: The table reports OLS results for share of papers with at least 75% new topics in 2 years (columns 1 and 2), in 3 years (columns 3 and 4), in 4 years (columns 5 and 6), and in 5 years (columns 7 and 8) and for share of papers with at least 90% new topics in 2 years (columns 9 and 10), in 3 years (columns 11 and 12), in 4 years (columns 13 and 14), and in 5 years (columns 15 and 16). The first model (columns 1, 3, 5, 7, 9, 11, 13, and 15) excludes all fixed effects, and the second model (columns 2, 4, 6, 8, 10, 12, 14, and 16) includes country and cohort (years X panel) fixed effects. The decrease in the number of observations from the 2-years to the 5-years variables is due to data collection in 2022, allowing a shorter observation period for some applicants based on their application year. For instance, the 2-years variable encompasses applicants from 2014 to 2019, while the 5-years variable includes only those from 2014 to 2016.

Table 4. Stage 2 regression results on the share of publications with new topics

	New topics 75%								New topics 90%							
	2 years		3 years		4 years		5 years		2 years		3 years		4 years		5 years	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
Funded	0.012	0.015	0.035	0.041*	0.040	0.007	0.019	0.012	0.016	0.016	0.030*	0.029*	0.050**	0.040*	0.018	0.019
	(0.023)	(0.023)	(0.023)	(0.023)	(0.032)	(0.031)	(0.033)	(0.032)	(0.015)	(0.015)	(0.016)	(0.016)	(0.024)	(0.023)	(0.025)	(0.025)
Distance	-0.016	-0.004	-0.007	0.005	-0.010	0.033	0.018	0.051*	-0.008	-0.0004	0.003	0.009	0.004	0.027	0.031	0.051**
	(0.012)	(0.014)	(0.013)	(0.015)	(0.026)	(0.027)	(0.026)	(0.028)	(0.008)	(0.009)	(0.009)	(0.010)	(0.019)	(0.020)	(0.020)	(0.021)
Female	0.016	0.008	0.003	-0.008	0.023	0.023	0.037**	0.033*	0.021**	0.017*	0.0001	-0.007	0.010	0.009	0.030**	0.030**
	(0.012)	(0.014)	(0.013)	(0.014)	(0.014)	(0.016)	(0.016)	(0.018)	(0.008)	(0.009)	(0.009)	(0.010)	(0.011)	(0.012)	(0.012)	(0.014)
log(Academic seniority)	-0.040***	-0.047***	-0.047***	-0.050***	-0.051***	-0.051***	-0.055***	-0.046**	-0.018**	-0.020**	-0.016*	-0.019*	-0.027**	-0.025**	-0.015	-0.005
	(0.013)	(0.014)	(0.013)	(0.014)	(0.015)	(0.017)	(0.017)	(0.019)	(0.009)	(0.009)	(0.009)	(0.010)	(0.011)	(0.012)	(0.013)	(0.014)
log(Publication history)	-0.116***	-0.111***	-0.157***	-0.154***	-0.163***	-0.156***	-0.173***	-0.163***	-0.044***	-0.046***	-0.066***	-0.067***	-0.082***	-0.075***	-0.085***	-0.071***
	(0.015)	(0.017)	(0.016)	(0.018)	(0.019)	(0.022)	(0.020)	(0.024)	(0.010)	(0.011)	(0.011)	(0.013)	(0.014)	(0.016)	(0.015)	(0.018)
log(Citation history)	-0.043***	-0.036***	-0.039***	-0.026***	-0.043***	-0.034***	-0.046***	-0.037***	-0.023***	-0.018***	-0.025***	-0.020***	-0.024***	-0.024***	-0.030***	-0.033***
	(0.007)	(0.008)	(0.007)	(0.008)	(0.008)	(0.010)	(0.008)	(0.011)	(0.004)	(0.005)	(0.005)	(0.006)	(0.006)	(0.007)	(0.006)	(0.008)
Duration	0.005	-0.027	-0.005	-0.035	0.030	-0.018	0.013	-0.008	-0.005	-0.013	-0.015	-0.043*	-0.006	-0.012	-0.014	-0.039
	(0.018)	(0.039)	(0.018)	(0.037)	(0.022)	(0.048)	(0.025)	(0.051)	(0.012)	(0.026)	(0.013)	(0.026)	(0.017)	(0.036)	(0.019)	(0.039)
Distance*I(Score> cut-off)	0.015	-0.012	0.004	-0.022	0.026	-0.018	-0.005	-0.056	-0.005	-0.017	-0.020	-0.025	-0.033	-0.058**	-0.034	-0.068**
	(0.017)	(0.021)	(0.017)	(0.023)	(0.033)	(0.038)	(0.035)	(0.042)	(0.011)	(0.014)	(0.012)	(0.016)	(0.024)	(0.028)	(0.026)	(0.032)
Country FE		x		x		x		x		x		x		x		x
Years X Panel FE		x		x		x		x		x		x		x		x
Observations	2,892	2,892	2,377	2,377	1,600	1,600	1,224	1,224	2,892	2,892	2,377	2,377	1,600	1,600	1,224	1,224
R-squared	0.112	0.182	0.158	0.238	0.202	0.297	0.236	0.333	0.061	0.139	0.088	0.170	0.114	0.217	0.138	0.255
F-test	45.39	2.66	55.37	3.32	50.29	3.56	46.80	3.60	23.51	1.93	28.63	2.20	25.52	2.33	24.35	2.47

Robust Standard Errors in Parentheses | *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Note: The table reports second-stage results for fuzzy RDD for share of papers with at least 75% new topics in 2 years (columns 1 and 2), in 3 years (columns 3 and 4), in 4 years (columns 5 and 6), and in 5 years (columns 7 and 8) and for share of papers with at least 90% new topics in 2 years (columns 9 and 10), in 3 years (columns 11 and 12), in 4 years (columns 13 and 14), and in 5 years (columns 15 and 16). The first model (columns 1, 3, 5, 7, 9, 11, 13, and 15) excludes all fixed effects, and the second model (columns 2, 4, 6, 8, 10, 12, 14, and 16) includes country and cohort (years X panel) fixed effects. The decrease in the number of observations from the 2-years to the 5-years variables is due to data collection in 2022, allowing a shorter observation period for some applicants based on their application year. For instance, the 2-years variable encompasses applicants from 2014 to 2019, while the 5-years variable includes only those from 2014 to 2016.

7. Conclusions

In this paper, we study whether receiving a post-doctoral mobility grant enables researchers to expand the scope of their research and move into new topics, considering it as a signal for research activities associated with cognitive exploration and intellectual growth. Most researchers experience thematic changes throughout their academic lifecycle by deviating from their established research paths (Horlings & Gurney, 2013; Kelchtermans et al., 2022), as a result of the dynamic and evolving nature of scientific research (Franzoni & Rossi-Lamastra, 2017; Siow, 1998). The cognitive exploration is critical especially in the early career phase, when researchers are expected to form distinct research paths balancing the deepening of the knowledge acquired during PhD with broadening the breadth of their research (Laudel, 2017; Laudel & Gläser, 2008). However, diversifying into new topics may come with challenges for young researchers who may need help accessing the necessary resources (such as funding, mentorship, and collaboration opportunities) to support research activities associated with cognitive exploration. In this paper, in a quasi-natural setting, we investigate the impact of receiving an early career grant (MSCA-IF) on diversifying into new research topics.

Our results indicate that being awarded MSCA-IF has a positive impact on expanding the breadth of the research portfolio. Funded applicants are more likely to produce a higher share of publications with at least 75% new topics relative to their pre-application portfolio compared to those who are not funded in three years after the application, although this effect disappears over time. To further understand the grant's impact on exploring (almost) entirely new research topics, we test a higher threshold of 90%. This means that publications would be considered to contain new topics only if at least 90% of their content is different from the pre-application publications. Receiving an MSCA-IF still has a positive impact, but even longer and higher in this case (i.e., deviating from the pre-grant research portfolio by at least 90%), compared to the 75% threshold. Increasing the threshold from 75% to 90% has larger effect on the results, especially when accounting for potential cohort-specific influences. The stronger impact at the 90% threshold emphasizes the importance of funding in promoting radical diversification, while the smaller and shorter effect at the 75% threshold indicates that moderate diversification can be more accessible even without funding. However, transitioning to entirely new topics (90% or more) appears significantly more challenging without necessary financial support.

Our findings highlight the role of MSCA-IF grants in expediting the exploration of new research topics, suggesting that they accelerate the process of expanding the scope of research. This could be attributed to the opportunity to relocate to a different institution, a key feature of MSCA-IF grants, which facilitate mobility within Europe for 12 to 24 months or beyond Europe for up to 36 months. This relocation often leads to exposure to new research themes, fresh responsibilities, additional resources, and collaboration opportunities, all of which contribute to the rapid diversification of research topics (S. H. Baruffaldi et al., 2020; Horlings & Gurney, 2013; Shi et al., 2015). The impact is linear and even amplified as the threshold increases, resulting in a larger and more sustained effect when we study radical diversification. While some level of diversification may naturally occur as researchers relocate, adapt and explore new ideas over the course of their academic careers (Kelchtermans et al., 2022; Laudel, 2017), achieving a more profound shift into entirely new topics often demands additional resources, such as targeted funding or institutional support (Madsen & Nielsen, 2024; Myers, 2018).

Overall, MSCA-IF grants seem able to offer more freedom and flexibility for granted applicants to explore. According to Franzoni and Rossi-Lamastra (2017), diversification can be a costly research strategy. Therefore, non-funded applicants may struggle to deviate thematically from their established research paths. The lack of financial resources may imply pursuing other employment opportunities, such as teaching or taking on less independent positions (like thematic postdocs), which could, in turn, potentially delay the research activities associated with cognitive exploration. We do not have information about any other funding opportunities that applicants may have accessed. Our analysis concentrates on the highest-ranked applicants who did not receive funding, indicating that they may have the potential to find other funding sources. However, even if most of the unsuccessful applicants could access comparable funding, those who receive funding from the MSCA-IF seem to engage in cognitive exploration by entering into new areas more quickly than those who do not receive funding.

Our findings provide valuable insights for policymakers and organisations that support early career researchers with post-doctoral mobility grants. We find that those grants favour research diversification and stimulate the intellectual growth of beneficiaries that appear aligned with the objectives of the MSCA-IF. Consequently, we can talk about a policy success case, as recipients can explore new topics and enjoy freedom and flexibility during their mobility. However, the positive impact of being funded appears to diminish and eventually disappear after a couple of years after having received the grant. There are possible explanations behind this temporal impact. It might be

that funded applicants resume their pre-grant trajectories, or non-funded applicants find alternative means of support later in time, allowing them to catch up winners. Future research should seek to identify the reasons behind the temporary positive impact of receiving the grant and determine whether there is a way to prolong it.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A.1. First-stage regression results for the fuzzy-RDD

Table A.1. First-stage regression results for the fuzzy-RDD

	Period 2014-2019		Period 2014-2018		Period 2014-2017		Period 2014-2016	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
I(Score> cut-off)	3.569***	4.515***	3.248***	4.171***	2.904***	3.559***	3.357***	4.262***
	(0.355)	(0.443)	(0.370)	(0.481)	(0.399)	(0.513)	(0.474)	(0.631)
Distance	2.468***	2.790***	2.978***	3.606***	5.032***	5.972***	4.583***	5.800***
	(0.303)	(0.339)	(0.357)	(0.437)	(0.625)	(0.802)	(0.784)	(1.106)
Female	0.469***	0.676***	0.438**	0.544**	0.597***	0.736***	0.582**	0.931**
	(0.182)	(0.227)	(0.184)	(0.239)	(0.212)	(0.284)	(0.269)	(0.376)
log(Academic seniority)	0.305	0.111	0.341*	0.126	0.517**	0.448	0.351	0.302
	(0.197)	(0.240)	(0.200)	(0.244)	(0.222)	(0.291)	(0.287)	(0.392)
log(Publication history)	0.038	0.218	-0.058	0.171	0.262	0.271	-0.051	-0.225
	(0.230)	(0.288)	(0.242)	(0.312)	(0.278)	(0.365)	(0.351)	(0.470)
log(Citation history)	-0.114	-0.025	-0.134	-0.098	-0.282**	-0.226	-0.195	-0.011
	(0.096)	(0.133)	(0.097)	(0.140)	(0.111)	(0.163)	(0.141)	(0.214)
Duration	0.027	1.522***	0.019	1.679***	-0.300	-0.393	0.164	0.104

	(0.248)	(0.569)	(0.259)	(0.565)	(0.309)	(0.970)	(0.375)	(1.096)
Distance*I(Score> cut-off)	-0.064	-0.369	-0.556	-0.888	-2.812***	-3.247***	-2.096*	-2.913*
	(0.687)	(0.782)	(0.757)	(0.918)	(0.966)	(1.190)	(1.180)	(1.539)
Country FE		x		x		x		x
Years X Panel FE		x		x		x		x
Observations	2,892	2,892	2,377	2,377	1,600	1,600	1,224	1,224
Log-likelihood	-514.334	-421.130	-470.510	-365.553	-355.322	-275.351	-232.831	-172.533
AIC	1,046.669	1,290.260	959.019	1,141.107	728.645	892.701	483.662	645.065

Robust Standard Errors in Parentheses | *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Note: Dependent variable is Funded (takes 1 if the applicant is funded and 0 if not funded). AIC refers to the Akaike Information Criteria. The first model (columns 1, 3, 5, and 7) excludes all fixed effects and the second model (columns 2, 4, 6, and 8) includes country and cohort (years X panel) fixed effects. The decrease in observations from Period 2014-2019 to Period 2014-2016 is due to both the choice of second-stage dependent variable and the data collection in 2022, which limits the available data for certain application years. Although we predict the probability of being funded using a logistic regression and report the corresponding values, we also run an OLS regression—not to predict the probability of being funded, but rather to calculate the F-statistics for evaluating the strength of the instrument in the first stage. The F-statistics from the OLS models are as follows: for the period 2014–2019, columns 1 and 2 show F-statistics of 1484 and 54.88, respectively; for the period 2014–2018, columns 3 and 4 indicate 986.10 and 40.87, respectively; for the period 2014–2017, columns 5 and 6 report 537.70 and 26.96, respectively; and for the period 2014–2016, columns 7 and 8 show 547.20 and 31.15, respectively.

Appendix A.2. Fuzzy-RDD results when controlling for pre-diversification

Table A.2. First- and second-stage regression results for the fuzzy-RDD when controlling for pre-diversification

	First-stage				Second-stage: New topics 75%				Second-stage: New topics 90%			
	Period 2014-2019	Period 2014-2018	Period 2014-2017	Period 2014-2016	2 years	3 years	4 years	5 years	2 years	3 years	4 years	5 years
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Funded					0.016	0.042*	0.008	0.014	0.017	0.030*	0.041*	0.018
					(0.023)	(0.023)	(0.031)	(0.032)	(0.015)	(0.016)	(0.023)	(0.024)
I(Score> cut-off)	4.533***	4.192***	3.618***	4.380***								
	(0.445)	(0.484)	(0.517)	(0.643)								
Distance	2.787***	3.596***	5.964***	5.818***	-0.004	0.005	0.033	0.050*	-0.001	0.007	0.025	0.050**
	(0.338)	(0.436)	(0.804)	(1.121)	(0.014)	(0.015)	(0.027)	(0.028)	(0.009)	(0.010)	(0.020)	(0.021)
Female	0.691***	0.560**	0.748***	0.944**	0.008	-0.007	0.022	0.033*	0.017*	-0.007	0.009	0.030**
	(0.228)	(0.241)	(0.284)	(0.377)	(0.014)	(0.014)	(0.016)	(0.018)	(0.009)	(0.010)	(0.012)	(0.014)
log(Academic seniority)	0.186	0.205	0.551*	0.486	-0.048***	-0.054***	-0.050***	-0.047**	-0.026***	-0.031***	-0.032**	-0.012
	(0.249)	(0.250)	(0.298)	(0.404)	(0.015)	(0.015)	(0.017)	(0.019)	(0.010)	(0.010)	(0.013)	(0.015)
log(Publication history)	0.377	0.366	0.535	0.133	-0.113***	-0.162***	-0.153***	-0.164***	-0.058***	-0.090***	-0.090***	-0.086***
	(0.319)	(0.339)	(0.399)	(0.511)	(0.019)	(0.020)	(0.023)	(0.026)	(0.012)	(0.014)	(0.017)	(0.019)
log(Citation history)	-0.029	-0.099	-0.232	-0.021	-0.036***	-0.026***	-0.034***	-0.037***	-0.018***	-0.020***	-0.023***	-0.033***
	(0.133)	(0.141)	(0.164)	(0.216)	(0.008)	(0.008)	(0.010)	(0.011)	(0.005)	(0.006)	(0.007)	(0.008)
Pre-diversification	0.127	0.165	0.217*	0.312*	-0.002	-0.007	0.003	-0.001	-0.010**	-0.020***	-0.013**	-0.014**
	(0.111)	(0.112)	(0.129)	(0.166)	(0.006)	(0.006)	(0.007)	(0.008)	(0.004)	(0.004)	(0.005)	(0.006)
Duration	1.541***	1.720***	-0.326	0.268	-0.027	-0.036	-0.017	-0.008	-0.015	-0.045*	-0.012	-0.041
	(0.569)	(0.565)	(0.949)	(1.073)	(0.039)	(0.037)	(0.048)	(0.051)	(0.026)	(0.026)	(0.036)	(0.039)
Distance*I(Score> cut-off)	-0.373	-0.857	-3.258***	-2.981*	-0.012	-0.022	-0.018	-0.056	-0.017	-0.024	-0.058**	-0.068**
	(0.783)	(0.922)	(1.189)	(1.548)	(0.021)	(0.023)	(0.038)	(0.042)	(0.014)	(0.016)	(0.028)	(0.032)
Country FE	x	x	x	x	x	x	x	x	x	x	x	x
Years X Panel FE	x	x	x	x	x	x	x	x	x	x	x	x
Observations	2,892	2,377	1,600	1,224	2,892	2,377	1,600	1,224	2,892	2,377	1,600	1,224

Log-likelihood	-420.474	-364.475	-273.932	-170.760												
AIC	1,290.947	1,140.950	891.865	643.520												
R-squared					0.182	0.238	0.297	0.333	0.140	0.178	0.220	0.258				
F-test					2.65	3.13	3.54	3.57	1.94	2.29	2.35	2.49				

Robust Standard Errors in Parentheses | *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Note: The table reports first- and second-stage results for the fuzzy RDD. Columns 1–4 report the first-stage regression results, where the dependent variable indicates the funding outcome, taking a value of 1 if the applicant is funded and 0 if not funded. Columns 5, 6, 7, and 8 report the second-stage regression results when the dependent variable is the share of papers with at least 75% new topics 2, 3, 4, and 5 years after the application, respectively. Columns 9, 10, 11, and 12 report the second-stage regression results when the dependent variable is the share of papers with at least 90% new topics 2, 3, 4, and 5 years after the application, respectively. All models include country and cohort (years × panel) fixed effects. The decrease in the number of observations from the period 2014–2019 to the period 2014–2016 in the first-stage models, and from the 2-year to the 5-year outcome variables in the second-stage models, is due to data collection in 2022, which allows a shorter observation period for some applicants based on their application year. For instance, the 2-year variable includes applicants from 2014 to 2019, while the 5-year variable includes only those from 2014 to 2016. The control variable "pre-diversification" represents the average number of topics per pre-grant publication at the time of application. Although we predict the probability of being funded using a logistic regression and report the corresponding values, we also run an OLS regression—not to predict the probability of being funded, but rather to calculate the F-statistics for evaluating the strength of the instrument in the first stage. The F-statistics from the OLS models are as follows: for the period 2014–2019, column 1 shows F-statistics 54.64; for the period 2014–2018, column 2 indicates 40.69; for the period 2014–2017, column 3 reports 26.88; and for the period 2014–2016, column 4 shows 31.09.

Appendix A.3. Sharp RDD results on the share of publications with new topics

Table A.3. Sharp RDD results on the share of publications with new topics

	New topics 75%								New topics 90%							
	2 years		3 years		4 years		5 years		2 years		3 years		4 years		5 years	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
I(Score> cut-off)	0.014	0.014	0.032*	0.038*	0.028	0.024	0.018	0.020	0.013	0.012	0.028**	0.028**	0.037**	0.043**	0.012	0.023
	(0.019)	(0.020)	(0.019)	(0.020)	(0.025)	(0.027)	(0.027)	(0.029)	(0.013)	(0.013)	(0.013)	(0.014)	(0.018)	(0.020)	(0.021)	(0.022)
Distance	-0.016	-0.005	-0.004	0.006	0.006	0.036	0.018	0.045*	-0.009	-0.002	0.003	0.005	0.015	0.031	0.034*	0.048**
	(0.011)	(0.013)	(0.012)	(0.014)	(0.023)	(0.026)	(0.024)	(0.027)	(0.007)	(0.009)	(0.008)	(0.010)	(0.017)	(0.019)	(0.019)	(0.021)
Female	0.013	0.005	0.003	-0.006	0.022	0.020	0.026	0.020	0.018**	0.013	-0.005	-0.010	0.007	0.007	0.024*	0.023
	(0.013)	(0.014)	(0.013)	(0.014)	(0.015)	(0.017)	(0.017)	(0.018)	(0.008)	(0.009)	(0.009)	(0.010)	(0.011)	(0.012)	(0.013)	(0.014)
log(Academic seniority)	-0.047***	-0.055***	-0.056***	-0.060***	-0.059***	-0.063***	-0.064***	-0.057***	-0.018**	-0.021**	-0.021**	-0.024**	-0.031**	-0.030**	-0.020	-0.010
	(0.014)	(0.015)	(0.014)	(0.015)	(0.016)	(0.018)	(0.018)	(0.019)	(0.009)	(0.010)	(0.010)	(0.010)	(0.012)	(0.013)	(0.013)	(0.015)
log(Publication history)	-0.113***	-0.106***	-0.157***	-0.153***	-0.167***	-0.164***	-0.176***	-0.166***	-0.044***	-0.047***	-0.066***	-0.067***	-0.084***	-0.081***	-0.086***	-0.069***
	(0.016)	(0.018)	(0.016)	(0.019)	(0.019)	(0.022)	(0.021)	(0.025)	(0.010)	(0.012)	(0.011)	(0.013)	(0.014)	(0.017)	(0.016)	(0.019)
log(Citation history)	-0.041***	-0.035***	-0.035***	-0.021**	-0.042***	-0.028***	-0.043***	-0.035***	-0.022***	-0.018***	-0.023***	-0.018***	-0.024***	-0.022***	-0.029***	-0.033***
	(0.007)	(0.008)	(0.007)	(0.008)	(0.008)	(0.010)	(0.009)	(0.011)	(0.004)	(0.005)	(0.005)	(0.006)	(0.006)	(0.007)	(0.007)	(0.009)

Duration	0.001	-0.058	-0.008	-0.054	0.025	-0.011	0.011	-0.005	-0.009	-0.026	-0.015	-0.039	-0.011	-0.004	-0.021	-0.037
	(0.018)	(0.040)	(0.019)	(0.039)	(0.023)	(0.049)	(0.025)	(0.051)	(0.012)	(0.027)	(0.013)	(0.027)	(0.017)	(0.036)	(0.019)	(0.039)
Distance*I(Score> cut-off)	0.017	-0.005	0.00003	-0.021	0.003	-0.046	-0.005	-0.059	-0.003	-0.011	-0.018	-0.018	-0.045*	-0.073**	-0.036	-0.069**
	(0.017)	(0.022)	(0.018)	(0.024)	(0.035)	(0.042)	(0.036)	(0.044)	(0.011)	(0.014)	(0.013)	(0.016)	(0.026)	(0.031)	(0.028)	(0.034)
Country FE		x		x		x		x		x		x		x		x
Years X Panel FE		x		x		x		x		x		x		x		x
Observations	2,734	2,734	2,218	2,218	1,469	1,469	1,148	1,148	2,734	2,734	2,218	2,218	1,469	1,469	1,148	1,148
R-squared	0.109	0.184	0.153	0.239	0.200	0.303	0.234	0.337	0.059	0.140	0.086	0.170	0.114	0.223	0.135	0.257
F-test	41.74	2.57	49.77	3.14	45.66	3.40	43.47	3.48	21.38	1.85	25.83	2.52	23.57	2.25	22.25	2.37

Robust Standard Errors in Parentheses | *** p-value < 0.01, ** p-value < 0.05, * p-value < 0.1

Note: The table reports sharp RDD results for share of papers with at least 75% new topics in 2 years (columns 1 and 2), in 3 years (columns 3 and 4), in 4 years (columns 5 and 6), and in 5 years (columns 7 and 8) and for share of papers with at least 90% new topics in 2 years (columns 9 and 10), in 3 years (columns 11 and 12), in 4 years (columns 13 and 14), and in 5 years (columns 15 and 16). The first model (columns 1, 3, 5, 7, 9, 11, 13, and 15) excludes all fixed effects, and the second model (columns 2, 4, 6, 8, 10, 12, 14, and 16) includes country and cohort (years X panel) fixed effects. The decrease in the number of observations from the 2-years to the 5-years variables is due to data collection in 2022, allowing a shorter observation period for some applicants based on their application year. For instance, the 2-years variable encompasses applicants from 2014 to 2019, while the 5-years variable includes only those from 2014 to 2016. We performed the sharp RDD with full compliance in our restricted sample. In other words, we exclude from the sample those applicants who are funded despite falling below the funding threshold and non-funded despite being above the funding threshold in their cohort.

References

Abbott, A. (2020). Farewell to Europe's Horizon 2020. *Nature*, *588*(7838), 371–371. https://doi.org/10.1038/d41586-020-03516-6

Angrist, J., & Lavy, V. (1999). Using Maimonides' Rule to Estimate the Effect of Class Size on Scholastic Achievement. *The Quarterly Journal of Economics*, *114*(2), 533–575.

Arora, A., & Gambardella, A. (2005). The Impact of NSF Support for Basic Research In Economics. *Annales d'Économie et de Statistique*, *79/80*, 91–117. https://doi.org/10.2307/20777571

Åstebro, T., & Thompson, P. (2011). Entrepreneurs, Jacks of all trades or Hobos? *Research Policy*, *40*(5), 637–649. https://doi.org/10.1016/j.respol.2011.01.010

Ayoubi, C., Pezzoni, M., & Visentin, F. (2019). The important thing is not to win, it is to take part: What if scientists benefit from participating in research grant competitions? *Research Policy*, *48*(1), 84–97. https://doi.org/10.1016/j.respol.2018.07.021

Azoulay, P., Graff Zivin, J., & Manso, G. (2011). Incentives and Creativity: Evidence from the Howard Hughes Medical Investigator Program. *The Rand Journal of Economics*, *42*(January), 527–554.

Baruffaldi, S. H., Marino, M., & Visentin, F. (2020). Money to move: The effect on researchers of an international mobility grant. *Research Policy*, *49*(8), 104077. https://doi.org/10.1016/j.respol.2020.104077

Baruffaldi, S., Santoleri, P., & Shevtsova, Y. (2024). *The Impact of Mobility Grants on Researchers* (SSRN Scholarly Paper 5046563). Social Science Research Network. https://papers.ssrn.com/abstract=5046563

Bastalich, W. (2017). Content and context in knowledge production: A critical review of doctoral supervision literature. *Studies in Higher Education*, *42*(7), 1145–1157. https://doi.org/10.1080/03075079.2015.1079702

Bateman, T. S., & Hess, A. M. (2015). Different personal propensities among scientists relate to deeper vs. Broader knowledge contributions. *Proceedings of the National Academy of Sciences*, *112*(12), 3653–3658. https://doi.org/10.1073/pnas.1421286112

Belkhouja, M., Fattoum, S., & Yoon, H. (David). (2021). Does greater diversification increase individual productivity? The moderating effect of attention allocation. *Research Policy*, *50*(6), 104256. https://doi.org/10.1016/j.respol.2021.104256

Belkhouja, M., & Yoon, H. (David). (2018). How does openness influence the impact of a scholar's research? An analysis of business scholars' citations over their careers. *Research Policy*, *47*(10), 2037–2047. https://doi.org/10.1016/j.respol.2018.07.012

Bol, T., de Vaan, M., & van de Rijt, A. (2018). The Matthew effect in science funding. *Proceedings of the National Academy of Sciences*, *115*(19), 4887 LP – 4890. https://doi.org/10.1073/pnas.1719557115

Cavallaro, M., & Lepori, B. (2021). Institutional barriers to participation in EU framework programs: Contrasting the Swiss and UK cases. *Scientometrics*, *126*(2), 1311–1328. https://doi.org/10.1007/s11192-020-03810-0

Dahlander, L., O'Mahony, S., & Gann, D. M. (2016). One foot in, one foot out: How does individuals' external search breadth affect innovation outcomes? *Strategic Management Journal*, *37*(2), 280–302. https://doi.org/10.1002/smj.2342

European Commission. (2014). *Horizon 2020 Work Programme 2014-2015: Marie Skłodowska-Curie Actions*. Publications Office.

https://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/main/h2020-wp1415-msca_en.pdf

European Commission. (2018). *Horizon 2020 Work Programme 2018-2020: Marie Skłodowska-Curie Actions*. Publications Office. https://ec.europa.eu/research/participants/data/ref/h2020/wp/2018-2020/main/h2020-wp1820-msca_en.pdf

European Commission. (2022). *Horizon Europe Work Programme 2023-2024: Marie Skłodowska-Curie Actions*. Publications Office. https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2023-2024/wp-2-msca-actions_horizon-2023-2024_en.pdf

European Commission, & Directorate-General for Education, Y., Sport and Culture. (2019). *Marie Skłodowska-Curie actions – Driving innovation, supporting researchers' mobility and cultivating excellence in doctoral and postdoctoral training – Facts & figures*. Publications Office. https://doi.org/10.2766/111647

European Commission, Directorate-General for Research and Innovation, Budraitis, M., Pranckevičius, P., Dėlkutė, R., Caturianas, D., Nikinmaa, J., Lecluyse, L., Legein, E., Notten, A., Es-Sadki, N., Wintjes, R., Visentin, F., Ciarli, T., Bonaglia, D., Sanditov, B., Yildiz, Y., Chavarro, D., & Núñez, L. (2023). *Evaluation study of the European framework programmes for research and innovation for excellent science – Horizon 2020 – Annexes*. Publications Office of the European Union. https://doi.org/10.2777/353383

Foster, J. G., Rzhetsky, A., & Evans, J. A. (2015). Tradition and Innovation in Scientists' Research Strategies. *American Sociological Review*, *80*(5), 875–908. https://doi.org/10.1177/0003122415601618

Franzoni, C., & Rossi-Lamastra, C. (2017). Academic tenure, risk-taking and the diversification of scientific research. *Industry and Innovation*, *24*(7), 691–712. https://doi.org/10.1080/13662716.2016.1264067

Ghirelli, C., Havari, E., Meroni, E., & Verzillo, S. (2023). The long-term causal effects of winning an ERC grant. *Working Papers*, Article 2313. https://ideas.repec.org//p/bde/wpaper/2313.html

Hackett, E. J. (2005). Essential Tensions: Identity, Control, and Risk in Research. *Social Studies of Science*, *35*(5), 787–826.

Heyard, R., & Hottenrott, H. (2021). The value of research funding for knowledge creation and dissemination: A study of SNSF Research Grants. *Humanities and Social Sciences Communications*, *8*(1), Article 1. https://doi.org/10.1057/s41599-021-00891-x

Horlings, E., & Gurney, T. (2013). Search strategies along the academic lifecycle. *Scientometrics*, *94*(3), 1137–1160. https://doi.org/10.1007/s11192-012-0789-3

Jacob, B. A., & Lefgren, L. (2011a). The impact of NIH postdoctoral training grants on scientific productivity. *Research Policy*, *40*(6), 864–874. https://doi.org/10.1016/j.respol.2011.04.003

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

Jaffe, A. B. (2002). Building Programme Evaluation into the Design of Public Research-Support Programmes. *Oxford Review of Economic Policy*, *18*(1), 22–34. https://doi.org/10.1093/oxrep/18.1.22

Jones, B. F. (2010). Age and Great Invention. *The Review of Economics and Statistics*, *92*(1), 1–14. https://doi.org/10.1162/rest.2009.11724

Jones, B. F. (2021). The Rise of Research Teams: Benefits and Costs in Economics. *Journal of Economic Perspectives*, *35*(2), 191–216. https://doi.org/10.1257/jep.35.2.191

Kelchtermans, S., Neicu, D., & Veugelers, R. (2022). Off the beaten path: What drives scientists' entry into new fields? *Industrial and Corporate Change*, *31*(3), 654–680. https://doi.org/10.1093/icc/dtab054

Laudel, G. (2017). How do National Career Systems Promote or Hinder the Emergence of New Research Lines? *Minerva*, *55*(3), 341–369. https://doi.org/10.1007/s11024-017-9314-4

Laudel, G., & Gläser, J. (2008). From apprentice to colleague: The metamorphosis of Early Career Researchers. *Higher Education*, *55*(3), 387–406. https://doi.org/10.1007/s10734-007-9063-7

Le, T., & Jaffe, A. B. (2017). The impact of R&D subsidy on innovation: Evidence from New Zealand firms. *Economics of Innovation and New Technology*, *26*(5), 429–452. https://doi.org/10.1080/10438599.2016.1213504

Leahey, E. (2006). Gender Differences in Productivity: Research Specialization as a Missing Link. *Gender and Society*, *20*(6), 754–780.

Lee, D. S., & Lemieux, T. (2010). Regression Discontinuity Designs in Economics. *Journal of Economic Literature*, *48*(2), 281–355. https://doi.org/10.1257/jel.48.2.281

Levinthal, D. A., & March, J. G. (1993). The myopia of learning. *Strategic Management Journal*, *14*(S2), 95–112. https://doi.org/10.1002/smj.4250141009

Madsen, E. B., & Nielsen, M. W. (2024). Do thematic funding instruments lead researchers in new directions? Strategic funding priorities and topic switching among British grant recipients. *Research Evaluation*. https://doi.org/10.1093/reseval/rvae015

Mannucci, P. V., & Yong, K. (2018). The Differential Impact of Knowledge Depth and Knowledge Breadth on Creativity over Individual Careers. *Academy of Management Journal*, *61*(5), 1741–1763. https://doi.org/10.5465/amj.2016.0529

March, J. G. (1991). Exploration and Exploitation in Organizational Learning. *Organization Science*, *2*(1), 71–87. https://doi.org/10.1287/orsc.2.1.71

Myers, K. (2018). The Elasticity of Science. *SSRN Electronic Journal*, *12*(4), 103–134. https://doi.org/10.2139/ssrn.3176991

Myers, K. (2020). The Elasticity of Science. *American Economic Journal: Applied Economics*, *12*(4), 103–134. https://doi.org/10.1257/app.20180518

Nagle, F., & Teodoridis, F. (2020). Jack of all trades and master of knowledge: The role of diversification in new distant knowledge integration. *Strategic Management Journal*, *41*(1), 55–85. https://doi.org/10.1002/smj.3091

National Research Council. (2005). *Bridges to Independence: Fostering the Independence of New Investigators in Biomedical Research*. National Academies Press (US). http://www.ncbi.nlm.nih.gov/books/NBK22690/

Non, M., van Honk, J., van Houten, V., van der Weijden, I., & van Leeuwen, T. (2022). *Getting off to a flying start? The effects of an early-career international mobility grant on scientific performance* (CPB Discussion Paper 443). CPB Netherlands Bureau for Economic Policy Analysis. https://econpapers.repec.org/paper/cpbdiscus/443.htm

Packalen, M., & Bhattacharya, J. (2019). Age and the Trying Out of New Ideas. *Journal of Human Capital*, *13*(2), 341–373. https://doi.org/10.1086/703160

Science Europe. (2016). *Postdoctoral Funding Schemes in Europe*. Zenodo. https://doi.org/10.5281/zenodo.5059939

Seeber, M., Vlegels, J., Reimink, E., Marušić, A., & Pina, D. G. (2021). Does reviewing experience reduce disagreement in proposals evaluation? Insights from Marie Skłodowska-Curie and COST Actions. *Research Evaluation*, *30*(3), 349–360. https://doi.org/10.1093/reseval/rvab011

Shen, Z., Ma, H., & Wang, K. (2018). *A Web-scale system for scientific knowledge exploration* (arXiv:1805.12216). arXiv. https://doi.org/10.48550/arXiv.1805.12216

Shi, F., Foster, J. G., & Evans, J. A. (2015). Weaving the fabric of science: Dynamic network models of science's unfolding structure. *Social Networks*, *43*, 73–85. https://doi.org/10.1016/j.socnet.2015.02.006

Shibayama, S., Baba, Y., & Walsh, J. P. (2015). Organizational design of University laboratories: Task allocation and lab performance in Japanese bioscience laboratories. *Research Policy*, *44*(3), 610–622. https://doi.org/10.1016/j.respol.2014.12.003

Siow, A. (1998). Tenure and Other Unusual Personnel Practices in Academia. *Journal of Law, Economics, & Organization*, *14*(1), 152–173.

Waele, I. D., Wizel, D., Puljak, L., & Koporc, Z. (2021). Ethics appraisal procedure in 79,670 Marie Skłodowska-Curie proposals from the entire European HORIZON 2020 research and innovation program (2014–2020): A retrospective analysis. *PLOS ONE*, *16*(11), e0259582. https://doi.org/10.1371/journal.pone.0259582

Wagner-Dobler, R. (1997). Self-Organization of Scientific Specialization and Diversification: A Quantitative Case Study. *Social Studies of Science*, *27*(1), 147–170.

Wang, Y., Jones, B. F., & Wang, D. (2019). Early-career setback and future career impact. *Nature Communications*, *10*(1), 4331. https://doi.org/10.1038/s41467-019-12189-3

Yoshioka-Kobayashi, T., & Shibayama, S. (2021). Early career training and development of academic independence: A case of life sciences in Japan. *Studies in Higher Education*, *46*(12), 2751–2773. https://doi.org/10.1080/03075079.2020.1817889

Zeng, A., Shen, Z., Zhou, J., Fan, Y., Di, Z., Wang, Y., Stanley, H. E., & Havlin, S. (2019). Increasing trend of scientists to switch between topics. *Nature Communications*, *10*(1), 3439. https://doi.org/10.1038/s41467-019-11401-8

Zuckerman, E. W., Kim, T., Ukanwa, K., & von Rittmann, J. (2003). Robust Identities or Nonentities? Typecasting in the Feature-Film Labor Market. *American Journal of Sociology*, *108*(5), 1018–1074. https://doi.org/10.1086/377518

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