Academic inbreeding and choice of strategic research approaches

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Abstract

Academic inbreeding is a phenomenon that has been studied mostly from the standpoint of its association with research productivity. The focus has been on knowledge creation outputs and outcomes, while little to no attention has been given to the association of academic inbreeding with knowledge creation strategies and processes in academia. This article focuses on the latter, confirming that academic inbreeding is detrimental to the research aspirations, innovativeness, risk-taking, and multidisciplinarity engagement of academics' research agendas, as predicted by literature. These findings, based on a sample of more than 7,000 academics from all fields of knowledge, working in more than 140 countries, do not find a greater influence of the PhD mentor on the strategic research agendas of homegrown academics as the literature would expect. The findings also underline critical differences between homegrown academics and silver-corded academics, stressing that the latter category of academics should not be considered part of the academic inbreeding process (which concept rests on immobility), but rather understood as a category of limited institutional mobility that deserves further study.

Second Language Abstract

A endogamia académica é um fenómeno que tem sido estudado maioritariamente do ponto de vista da sua associação com a produtividade científica. O foco das investigações empíricas tem sido na produção de conhecimento e resultados associados, enquanto que pouca ou nenhuma atenção tem sido dada à associação da endogamia académica com as estratégias e processos de criação de conhecimento no mundo académico. Este artigo foca-se neste último tópico, confirmando que a endogamia académica tem um efeito prejudicial na ambição de investigação, inovação, tomada de risco, e participação multidisciplinar nas agendas de investigação dos académicos, tal como previsto pela literatura. Estes resultados, baseados numa amostra de mais de 7000 académicos de todas as áreas de conhecimento, que se encontram a trabalhar em mais de 140 países, por outro lado, não indicam a existência de uma maior influência do mentor de doutoramento nas agendas de investigação estratégicas dos académicos endogâmicos, tal como seria de esperar pela literatura. Estes resultados sugerem também diferenças críticas entre os académicos endogâmicos e os académicos "silver-corded", indicando que esta última categoria não deve ser considerada como parte do processo de endogamia académica (cujo conceito é definido pela imobilidade), mas deve ser antes entendida como uma categoria de mobilidade institucional limitada que precisa de estudos adicionais.

Keywords: Academic inbreeding; Research agendas; Academic research; Education and career immobility; knowledge processes; Academic profession.

Introduction

Academic inbreeding (also known as institutional inbreeding) refers to a practice by which one concludes a PhD at a given university, then is hired as an academic by the same university, and

spends there the entire academic career (Horta, 2013). The academics following this route are designated in the literature as inbred academics, but this designation acquired throughout time a cultural and social negative connotation which borders on the discriminatory. Therefore, we designate these academics as "homegrown academics", a term suggested and characterized by some authors (e.g, Gonzalez et al., 1995; Grochocki, 2020) as a more neutral term but aligned with the central tenets of academic inbreeding, that is, academics' lacking institutional mobility, possessing strong alma mater identity, and reliant on institutional networks and localized knowledge (Altbach et al., 2015). The extreme immobility characterizing the career path of homegrown academics is at the center of the concept of academic inbreeding, raising issues that are problematic to the creation, renovation, and dissemination of knowledge (Dutton, 1980; Berelson, 1960; Caplow and McGee, 1958). Other than matters relative to knowledge processes, academic inbreeding is also considered to be a practice that underlines the primacy of nepotism, particularism, and parochialism to the detriment of academic recruitment based on principles of meritocracy, transparency, and open-competition (Burris, 2004). A consequence of this practice is that those hired in-house are likely to become subservient to senior academics that had the institutional power to have them hired, and are also more malleable to conform to established practices of the hiring institution because they have high degrees of institutional identity (Horta et al., 2011). Therefore, academic inbreeding may work as a social mechanism bound to maintain the status quo, organizational ossification, and extend institutional cultures, often of mediocrity, where high performers of any academic group may be marginalized under the guise of tradition, and organizational stability (Hermanowicz, 2013).

Academic inbreeding is empirically studied in the literature mainly from two perspectives. Both relate to knowledge creation processes but assume two different focuses. The most researched focus refers to the relation between academic inbreeding and research performance. This has been a central focus since the practice was decried as nefarious to scholarly activities in the early 20th century. Most of the findings shows that the relation between academic inbreeding and research performance is negative in terms of its production, quality, and visibility (e.g, Horta, 2013; Inanc and Tuncer, 2011; Eisenberg and Wells, 2000; Hargens and Farr, 1973). The few studies not finding this relationship statistically significant or even finding positive associations tend to use conceptualizations of academic inbreeding which are loose, broad, and not attuned to the central tenet of the definition of the phenomenon, that is, immobility (as conceptually argued by Caplow and McGee, 1958 and Berelson, 1960, and empirically validated by Horta, 2013)[1]. The other perspective departed from the arguments raised by Pelz and Andrews (1966) stating that homegrown academics are less creative, innovative, and willing to change research topics than mobile academics. Homegrown academics behave like this because they lack the exposition to other scholarly environments due to their lack of institutional mobility, but also because their local knowledge is overemphasized, it becomes parochial and resistant to outside knowledge influences, resulting in knowledge creation processes that are more akin to reproduce institutionally accepted knowledge rather than searching for new knowledge (Hollingshead, 1938). Furthermore, since their formation as academics was limited only to an in-house research socialization, it fits institutionally established power structures, meaning that the research agendas of homegrown academics are likely be more influenced by senior academics, remitting them to have lesser research independence and scientific ambition (Pelz and Andrews, 1966). This perspective has never been the empirical focus of any analysis, but rather integrated in academic inbreeding and research performance analyses (Morichika and Shibayama, 2015), or discussed in position papers about academic inbreeding (e.g, Ogren, 1949).

This study advances the state of the art on academic inbreeding by focusing on the latter perspective and analyzing it using quantitative methods. Based on a dataset of academics of all fields of knowledge, based all around the world, and having at least one publication in international journals, the study tests Pelz and Andrews's (1966) assumptions. The research question of this study is thus, as follows: do homegrown academics have strategic research agendas that are less innovative, ambitious, and adaptable than those of mobile academics. The strategic research agendas of academics are characterized based on the Multi-Dimensional Research Agendas Inventory – Revised (MDRAI-R), a validated inventory including the characteristics of academics' research agendas (Horta and Santos, 2020), comprising a set of dimensions appropriate for this study, including one that pertains as to how much the PhD mentor still influences current research agenda choices.

Literature review

Academic inbreeding is globally widespread, present in both large, small, developing, and developed higher education systems, and it is so because it is a key part of the evolution of any higher education and academic research systems (Horta and Yudkevich, 2016). It is a practice that has been denounced to be detrimental to academic endeavors since the early 20th century (Eliot, 1908) but difficult to be mitigated and eradicated (Klemenčič and Zgaga, 2015). Even in higher education systems where academic inbreeding has been mostly subsided, such as the UK and the US, there are few disciplinary and institutional clusters where the practice endures (Arismendi and Penaluna, 2016; Johnston and Brack, 1983). The reasons for the resilience of academic inbreeding relates to its entrenchment in the academic culture of universities (Padilla, 2008). It consolidates power structures benefiting often senior academics, thus providing a powerful incentive for the practice to be maintained (Godechot and Louvet, 2008), and becomes understood as part of the "normal" academic life (Altbach et al., 2015). Legal drastic measures to curtail the practice have been enforced in some countries, with varied degrees of success (Kosmulski, 2015), but the main challenge has been one of changing institutional cultures, and public policies promoting change of mentalities and behaviors through national and international mobility schemes has been suggested as a strategy that may take longer but be more effective (Horta and Yudkevich, 2016; Tavares et al., 2019).

The academic inbreeding phenomenon has been a regular occurrence in the development of higher education systems throughout the world, and it is so because of the benefits that it brings when higher education systems are developing (Horta and Yudkevich, 2016). When a higher education system is at its infancy, universities scurry to develop research capacity and the ability to offer doctoral programs by either recruiting foreign academics holding a PhD or by recruiting nationals that did the PhD abroad in scientifically advanced countries, to be part of the academic staff (Yonezawa et al., 2016). This initial academic staff will start supervising PhD students, leading to the promotion of academic inbreeding through a win-win situation for everyone involved in this process. The supervised PhDs become future colleagues of their supervisors, likely follow the same knowledge perspectives, share beliefs, and legitimize the supervisor's knowledge and power institutionally. Asymmetric power relations created since the supervisor-supervisee relationship ought to guarantee a defined hierarchical structure. The supervisors, as senior academics, will have in their PhD graduates, later colleagues, a source of institutional power that will grow with more PhD students supervised joining the academic ranks (Godechot and Louvet, 2008). There is a perpetuity to this power relation, consolidated through training and knowledge networks: the PhD students of the senior academics, when becoming colleagues will have PhD students of their own that likely will establish research agendas that will continue to be linked to shared – if not the same - research topics, views and

focuses of their PhDs supervisor, and the PhD supervisor of their supervisor (Shibayama and Kobayashi, 2017). In this way, a power clique is built, resting on shared identities, social and intellectual relations and common goals, values, and views regarding legitimized knowledge but also institutional traditions, belonging, and operations (Vásquez-Cupeiro and Elston, 2006; Cole and Cole, 1973).

In the aforementioned context, PhD students are in a privileged position since they are aware that they will be hired by their Alma Mater after concluding the PhD. Their research socialization within the organization means that they will likely accept a given knowledge as legit and willingly comply with the beliefs of the institutional culture and norms, often dictated by those who have socialized and trained them during their doctorate (Horta et al., 2011). This means that these academics face a trade-off: for the job-security and working in a homophilic institutional environment where they most likely feel accepted and valued, they are also less exposed to different experiences, competitive frameworks, and scholarly cosmopolitan activities (Dutton, 1980). This expectedly leads homegrown academics to be less risk-taking, ambitious, creative, research prolific, innovative, and command lower reputation nationally and internationally (Horta et al., 2010; Blau, 1973; Hargens and Farr, 1973; Pelz and Andrews, 1966; McGee, 1960). Unlike homegrown academics, silver corded academics – which are often assumed to be analytically equals to homegrown academics – are not ascribed the same characteristics. Since silver-corded academics have a history of institutional mobility between the completion of their degree and the return to the Alma Mater, they are considered to be more competitive, independent, and networked outside their university than homegrown academics (Caplow and McGee, 1958). They were also expected to be more accomplished scholars than mobile academics, but empirical analyses did not confirm this expectation (Horta, 2013).

For universities in the initial stages of development of a higher education system, the benefits brought by academic inbreeding are clear: errors in hiring new academic staff – one of the greatest arguments for academic inbreeding – are strongly diminished since the academic staff gets to know the potential new staff during their PhD years (Horta, 2013). Universities are fairly certain that they are hiring in-house candidates with organizationally desirable knowledge, identity, and behavioral characteristics (i,e: compliance; Horta et al., 2011). The certainty of employment means many are attracted to do a PhD, permitting that a qualified academic staff is formed in a relatively short time span. This quick built-up of qualified academic staff provides a competitive edge for some universities to become more research oriented faster than others, accumulating prestige in national higher education systems, while having an academic staff formed in-house, and therefore with a strong sense of institutional identity, compliance, and commitment[2]. Therefore, it is not surprising that the universities with the highest incidence of academic inbreeding are the oldest, most prestigious, and research-oriented universities in any higher education system (e.g, Tavares et al., 2015). Academic inbreeding is such a powerful mechanism in the early development of universities, that a few – usually older - universities may become prominent in supplying their PhD graduates to other less prestigious universities and form networks of influence, control, and power – determining also what ought to be considered legitimized knowledge – over and across a number of universities in the same national higher education system (see Shimbori, 1969).

The challenge is that as universities with high rates of academic inbreeding develop, the overemphasis on institutionally accepted knowledge leads research processes to become more akin to reinforcement of existing knowledge rather than a search for new knowledge (Yamanoi, 2005). As these universities usually tend to become organizationally ossified and overly reliant on localized knowledge, they tend to ignore or reject cosmopolitan knowledge perspectives and activities that are essential for contemporary knowledge creation processes and key

components of universal science (Popov, 2012; Gouldner, 1957). The lack of cosmopolitanism and overemphasis on local knowledge by large proportions of homegrown academics means that these universities will tap less into global and other external knowledge flows and their academic staff likely assume a more rigid, disciplinary and conservative perspectives on research which will not be attuned with multidisciplinarity, versatile, and risk taking attitudes that are urged from academic research in face of increasingly complex challenges (Bozeman and Corley, 2004). These beliefs and characteristics will likely lead to a feeling of false self-acknowledgment and standing (Hermanowicz, 2013), in an organization that will be mostly harmonious and efficient but one that marginalizes mobile academics, thinking and actions that run against the status quo (Horta et al., 2011). So far, only one study demonstrated that the lower research performance of homegrown academics is the result of these academics greater reliance on in-house knowledge networks which underlines also the likelihood that these academics are possibly less ambitious, innovative, risk taking and reliant on disciplinary research approaches (Horta et al., 2010) but do the research strategic agendasof homegrown academics really have these traits, comparatively to their mobile peers?

To begin answering this question, it is important to first define what constitutes a 'research agenda', a term that can be intuitively understood, but is more difficult to formalize. The literature considers that a 'research agenda' comprises both an operating framework used to pursue a given research goal, and a set of actions taken towards that goal (Ertmer & Glazewski, 2014). Thus, it has both a strategic layer and an operational layer. The operational layer relates to the choice and use of specific theories, language and methods that are legitimately accepted as appropriate to carry out research in a particular disciplinary or sub-disciplinary field, but are often difficult to generalize beyond the communities of the given field. The strategic layer is believed to be more universal and generalizable to most academics, as its strategic aims and purposes relate to common concerns and ambitions relative to careers paths and progression. These strategic aims are also influenced by similar institutional and organizational incentives, scientific desires, collaborative purposes and needs, field and community positioning, and knowledge advancement intentions. This study focuses on the strategic layer, using a framework to operationalize the conceptualization of strategic research agendas (Horta & Santos, 2016, 2020).

In this framework, strategic research agendas comprise eight distinct dimensions, some of which can be subdivided into more granular dimensions. The first dimension is *scientific ambition*, which represents the desire to acquire recognition and prestige in a given field (Brew et al., 2016), and to publish scientific articles (Horodnic & Zaiţ, 2015). These are key components of academic research. Recognition is a form of intangible capital that asserts the relative credibility of academics to their peers, and is intuitively the ultimate goal of all academics who aim to make their work known in their field and even beyond (Bourdieu, 1999). Publication is generally the way to achieve this goal – as classically demonstrated by the dynamics of cumulative advantage (Allison et al., 1982; Merton, 1968). The second dimension, *divergence*, relates to one possible strategy to attain such goals. It involves expansion into other fields of knowledge beyond one's point of origin, and an overall preference for engaging in multidisciplinary research (Horlings & Gurney, 2013). A low score in this dimension is indicative of *convergence*, an alternative strategy that may lead to hyper-specialization within a topic and a preference for stable fields of knowledge (Leahey, 2007).

The third dimension is *discovery*, the drive towards fields or topics conductive to scientific discovery (Merton, 1957; Popper, 2005). A preference for discovery can be perceived as a "high-risk, high-reward" approach, as results are not guaranteed in the path of cutting-edge science, and funding may be harder to secure. Thus, academics in some fields are known to

shy away from such an approach due to career considerations (Rzhetsky et al., 2015). When the latter occurs, we observe a negative manifestation of this dimension, which is the *conservative* approach (operationalized as low scores in the *discovery* dimension), a preference to work in mature, safer topics, and a focus on incremental research findings (Klavans et al., 2013). The *tolerance to low funding* dimension represents the propensity to engage in research topics even in the absence or scarcity of research funding (Edwards, 2020). The degree of *collaboration* is a dimension that evaluates both the willingness and opportunity to engage in collaborative research ventures (Birnholtz, 2007). This dimension is of key relevance to academic inbreeding in terms of the direction of collaboration (Tavares et al., 2021). Also critical to academic inbreeding is the dimension *mentor influence*, which represents the degree to which a PhD mentor influences one's research focus (Sinclair et al., 2014). Finally, the last two dimensions aim to identify the ends to which the strategic research agendas are aligned. *Academia-driven* agendas are aligned towards priorities established by the field and community, or alternatively, by the academic's own institution (Billot, 2010). *Society-driven* agendas, in contrast, are aligned towards tackling societal challenges and also involve consultation with non-experts (Loureiro et al., 2020).

The interplay between individual ambitions, preferences and institutional contexts is apparent in the aforementioned dimensions, as academics are expected to be influenced by and shape their strategic research agendas based on a combination of individual traits, socialization experiences, and the institutional context in which they work (see Horta & Santos, 2019). Therefore, it is plausible that homegrown, silver-corded, and mobile academics will focus their strategic research agendas differently.

Method

Data

The data for this study covers academics, working worldwide and in all fields of knowledge, that published internationally at least an article between 2010 and 2016. The data was initially collected for a research project focusing on the strategic research agendas of scientists, through a survey containing questions on demographical data, the revised version of the Multi-Dimensional Research Agendas Inventory – MDRAI-R (Horta & Santos, 2020), the Multi-Dimensional University Research Workplace Inventory - MDURWI (Santos, 2018), complemented with educational and professional information. The invitations were sent in temporally spaced batches, beginning in June 2017 and ending in August 2018. This invitation included a brief description of the project and its goals, as well as an opt-out link. Acceptance of the invitation led the participant to an informed consent form, to which they were required to agree before being able to proceed to the survey. The survey obtained 12,183 full responses. Since academic inbreeding is a phenomenon pertaining only to academic institutions, we filtered those only working in academia, leading the current study to be based on a sample of 7,158 academics.

The dependent variables concerning the strategic research agendas are based on the sub-dimensions of the MDRAI-R (explained in the literature review and summarized on Table 1). The research agendas of academics are usually considered by academics at the onset of any given research project they are prepared to undertake but can also define research preferences assumed throughout the research career, and highlights specific strategic ideas and choices that

determine topical choices and bound to influence operational directions (Santos and Horta, 2018). The MDRAI-R is concerned with strategic research choices only, and not with operational choices – such as preference for specific theoretical, conceptual or methodological focuses and paths, nor is the framework intended on evaluating the appropriateness of choices, strategic or operational (Horta and Santos, 2020). The purpose is one of characterization. The sub-dimensions and the clustered transformation of MDRAI-R though, allows to assess the intention of the academics to engage in collaborative, ambitious, multidisciplinary, disruptive, risky strategic research agendas as well as who may influence them.

The analysis is organized in two stages. In the first stage, the dependent variable results from a cluster analysis of the sub-dimensions, which originated two clusters (in alignment with a similar cluster analysis of the inventory; see Santos and Horta, 2018): one labeled "trailblazing" referring to strategic research agendas that lean towards disruptive, multidisciplinary, collaborative and riskier knowledge processes, and other labeled "cohesive", which is the baseline in this analysis, and characterized by leaning more towards disciplinary, incremental research, and the confirmation of known knowledge. The results of this clustering analysis can be found in Table A1 in the Appendix, and the characteristics of each are aligned with the assumption that mobile academics and silver-corded will lean more towards "trailblazing" research agendas, while homegrown academics, will prefer "cohesive" research agendas. Descriptive statistics show that about 42% of the academics in the data lean towards "trailblazing" research agendas; 41% of homegrown academics and mobile academics, and 42% of silver corded are oriented towards "trailblazing" research agendas, showing a similar orientation in terms of the general orientation of their strategic research agendas (Table 3).

[TABLE 1 AROUND HERE]

In the second stage, a regression will be run to consider the associations between homegrown academics (silver-corded academics as well) in comparison with mobile academics, and each of the MDRAI-R sub-dimensions shown on Table 1. The analysis considers several control variables that are known to influence research related decisions, processes, outputs, and outcomes. These variables include dimensions of the Multi-Dimensional University Research Workplace Inventory - MDURWI (Santos, 2018), which measures organizational features of an academic research workplace known to influence the formulation of strategic research agendas (Horta & Santos, 2019). Each dimension of the MDURWI is explained in Table 2. Also included as a control in the model is a variable termed "educational inbreeding" referring to those academics that did their entire tertiary education in a single university, notwithstanding if later on they became homegrown academics, silver-corded academics, or mobile academics (53% of the academics in the sample did so). The inclusion of this variable in the analysis permits to better understand to what extent immobility during education may evidence similar behavior with PhD to the academic career immobility (i.e, academic inbreeding).

[TABLE 2 AROUND HERE]

The other control variables, such as gender, age[3], time since PhD, working in one the world's 500 top-ranked universities[4] (using ARWU World University Ranking data) and fields of knowledge are variables known to predict research productivity, but also choices and behaviors

pertaining to academic research practices (see for example: Kwiek & Roszka, 2020). The explanatory variables are as follows: homegrown academic, if one works in the same institution where one's PhD was obtained, and never worked anywhere else after completing the PhD. Silver-corded academic, if one currently works in the same institution where one's PhD was obtained but had changed workplaces after completing the PhD returning to work afterwards to one's Alma Mater. Mobile academics are the baseline and refer to academics that are working in a different university than the one where they completed their PhD. 9% of the academics in the sample are homegrown academics, 23% silver-corded, and 68% mobile academics (Table 3)[5]. Countries where the academics work are used as fixed effects, but their results not included so that the tables do not grow out of proportion. The most represented countries were the United States (N = 1352; 18.9%), Italy (N = 460; 6.4%), the United Kingdom (N = 433; 6.0%), Spain (N = 309; 4.3%), and France (N = 308; 4.3%). The remaining participants were distributed over a myriad of other countries[6].

[TABLE 3 AROUND HERE]

Model

The main dependent variable in our analysis is "trailblazing", a dichotomous variable taking the value of 1 when the academic is identified with strategic research agendas that lean towards disruptive, multidisciplinary, collaborative and riskier knowledge processes, while the reference case (trailblazing = 0) identifies academics with cohesive agendas. The variable is modelled through logit regressions against two indicators for "homegrown" and "silver-corded" academics (the reference case is "mobile" academic), and either a "reduced" or "full" set of independent variables (the reduced set excludes individually perceived organizational orientation features, namely, *Leadership satisfaction*, *Belonging*, *Will to stay*, *Resources*, *Autonomy*, *Unconstraint* and *Social satisfaction*). The regression we estimate is the following:

[eq. 1]

Where P is the probability of trailblazing agendas; *HG (Homegrown)* and *SC (Silvercorded)* are dummy variables for homegrown and silver-corded academics; X_j (including *Female, Ln age, Time since PhD, Engineering and Technology, Humanities, Medical and Health sciences, Natural sciences, Social sciences, Educational inbreeding, Top-500 university* and *Leadership satisfaction*) and Z_k (including *Belonging, Will to stay, Resources, Autonomy, Unconstraint* and *Social satisfaction*) are vectors of the controls, with X_j included in both the reduced and full specifications and Z_k only in the full specification; is the constant term; β_i is the coefficient for all regressors; and is the error term.

In the second stage of our analysis, we use each of the MDRAI-R sub-dimensions (Mentor Influence, Tolerance to low funding, Discovery, Scientific ambition—Prestige, Scientific ambition—Drive to Publish, Divergence—Branching out, Divergence—Multidisciplinarity, Collaboration—Willing to Collaborate, Collaboration—Invited to Collaborate, Academic driven—Field oriented, Academic driven—Institution oriented, Society driven—Society oriented, Society Driven—Non-academic oriented) as dependent variables. Each of these variables is regressed in an ordered logit model[7] (because each variable is measured on an ordered 1–7 scale) against an indicator for "homegrown" or "silver-corded" academic (reference case: "mobile" academic), and the "full" set of independent variables, with the same

specification as in equation 1. The OLS regressions yield qualitatively similar results, which we do not report here.[8]

Findings

The analysis of Table 4 shows that homegrown academics lean less towards trailblazing research agendas, when compared with mobile academics. They lean less towards trailblazing research agendas by 6 percentage points. This result meets the expectations of Pelz and Andrews (1966) that homegrown academics research agendas will be characterized by "safer", disciplinary bound and incremental research because they lack the necessary creativity, openness and exposition to external knowledge flows that are necessary to engage in riskier, multidisciplinary, and disruptive knowledge creation agendas. When Model 2 includes the dimensions of the MDURWI, which relate to the academics' perceptions of the organizational features of the academic research workplace, the effect and significance of the disparity between homegrown and mobile academics concerning engagement with trailblazing agendas becomes more evident (the marginal effect corresponds to an increase of -7.3 percent[9]). The results for silver-corded academics are similar to those for homegrown academics. Silver-corded academics are 3.4 percent less oriented towards Trailblazing research agendas than mobile academics in the first model, and 4.5 percent less so in the second model. This suggests that even if some mobility has occurred in the cases of these academics, whereby they obtained their PhD, worked elsewhere and then returned to the Alma Mater, their behavior is more akin to the one of homegrown academics than to the one of mobile academics, although the effect and significance is not as strong as that of homegrown academics. This is not aligned with the predictions of Caplow and McGee (1958) which expected silver-corded academics to be even more creative, innovative, and accomplished than mobile academics. The reason for this non-alignment between expectations and findings may be contextual because Caplow and McGee (1958), when proposing the term "silver-corded" were referring to a specific condition of sponsored mobility in the US higher education system, where academics return to the Alma Mater after proving themselves to be excellent PhD students there and then able to maintain research dynamics and qualities in a different research environment, which makes them worthy to return. In other systems, this mobility is not sponsored but likely results from a desire from academics that left the Alma Mater to be able to return since these universities are also the most prestigious in their national higher education systems (Tavares et al., 2015).

For the control variables, female academics, time since PhD[10], and working at a top 500 university are not statistically significant. These are relevant findings in the sense that they may point towards a changing academic research behavior of female academics in a recent trend that shows these academics closing the research productivity gap to male academics (van Arensbergen et al., 2012). Also pertinent is the fact that academics working at top 500 universities are not leaning more towards trailblazing agendas, when it would be expected that they would since they work in the most intensive research universities (see Leech et al., 2015). More expectedly, age has a negative correlation with trailblazing (only statistically significant in Model 1). Education inbreeding, that is, concluding all the tertiary degrees in the same university, positively correlates with academics leaning towards trailblazing agendas, which suggests that education immobility has a different effect than academic career immobility. It may be that remaining in the same university during tertiary education provides the stability and focus to build a learning base that provides the confidence for one to engage later on during the academic career in traillazing research agendas. The effect may be akin to the negative effect that educational mobility has on research productivity in contrast with the positive effect that international and sectorial mobility has for those working in academia (Horta et al., 2019).

In model 2, the positive effects that autonomy, financial resources, and social satisfaction (i.e, includes the scholarly quality of colleagues), and the negative effects of will to stay and unconstraint are attuned to the literature (see Horta and Santos, 2019).

[TABLE 4 AROUND HERE]

The analysis of Table 5 provides a more fine-grained understanding of the lesser leaning of homegrown academics and silver-corded academics towards trailblazing strategic research agendas. It indicates that homegrown academics are less likely to engage in risky research projects that may lead to scientific breakthroughs (the research agendas of homegrown academics are less focused on *discovery* when compared with mobile academics by 19.6%)[11]. It is relevant to add that although risky research agendas may not lead necessarily to scientific breakthroughs, they always tend to produce new knowledge since these results prevent redundancy (in case the research ends up to be a dead-end) and may lead to new avenues of research, unthought about until the conclusion of that research. However, the key issue here is the relevance of taking a risk and leave research comfort zones, which according to Pelz and Andrews (1966) is something that due to their socialization and environment, homegrown academics have more difficulties to do (see also Morichika and Shibayama, 2017). According also to several scholars expectations, such as Hargens and Farr (1973) Pelz and Andrews (1966) and McGee (1960) to name a few, homegrown academics are also less ambitious than mobile academics in terms of trying to assume a position of authority in the field (by 14.6% points when compared to mobile academics). This may be related to their greater focus on privileging their university than the broader field of knowledge as the focus of their ambition as well as the source of resources (material and immaterial, including symbolic; see Gokturk & Yildrim-Tasti, 2020). It may be the case, that homegrown academics may acknowledge that only with difficulty they would be able to attain this kind of intellectual authority in the field of knowledge where they would be competing with a broader range of academics that tend to be more competitive than they are (as shown by empirical work on the relationship between academic inbreeding and research productivity; e.g: Horta et al., 2010). It may be that their lesser ambition is the combination of both reasons. Finally, homegrown academics strategic research agendas were envisioned as less multidisciplinary when compared to mobile academics (by 15.4%), which is expected by the literature since the socialization and knowledge creation ethos of homegrown academics is expected to derive more towards disciplinary, traditional and conservative research approaches due to their lesser exposition to external knowledge flows (Bozeman and Corley, 2004; Popov, 2012).

The findings above show that the arguments proposed by Pelz and Andrews (1966) to characterize homegrown academics research abilities and engagement are confirmed. However, the expected greater intervention of the PhD mentor in their research agenda is not observed since the influence of the PhD mentor in homegrown and mobile academics does not differ. Since this result could be explained by the fact that many of the PhD mentors of homegrown academics could have retired or passed away, a further analysis was performed for those academics with up to 10 years after concluding the PhD, but the results of that analysis remained unchanged[12]. Surprisingly, homegrown academics are not more bound to have their research agendas more aligned with the strategic research objectives of the university where they work compared to mobile academics, since no statistically significant differences were found. This is an unexpected finding, since the literature on academic inbreeding highlights homegrown academics as strongly identified with institutional commitment, identity, and

compliance with institutional objectives and demands (e.g, Gokturk & Yildrim-Tasti, 2020; Yamanoi, 2005). The lack of statistical significance between homegrown and mobile academics concerning establishment of collaborative research aendas (either through willingness or invitation) is not as surprising. The key difference between homegrown and mobile academics concerning research collaborations is bound to be more related to the localization of those collaborations (homegrown academics are bound to privilege collaborations within the university and associated to local knowledge; Tavares et al; 2021; Horta et al, 2010) than with the intend to collaborate.

The findings concerning silver-corded academics are perhaps less expected than the ones concerning homegrown academics, at least relative to the expectations of Caplow and McGee (1958). Similar to homegrown academics, silver corded academics tend to draw research agendas that are less focused on garnering scientific prestige and contribute to attain positions of scientific authority in a given field or discipline when compared to mobile academics (by 11.8%). However, silver corded academics tend to have their strategic research agendas less influenced by their PhD mentor, but are also less likely to receive invitations to collaborate in research projects, and to align their strategic research objectives with those of the university where they work (their Alma Mater) comparatively to mobile academics. While the lesser influence of the PhD mentor in the devising of their research agendas suggests a greater research independence when compared to mobile academics, the lower levels of ambition (from the standpoint of prestige), less invitations to collaborate and lack of alignment with university research objectives provides a set of mixed signals. On the one hand, it shows research independence that is needed for one to prevail in contemporary competitive research environments, but on the other hand, the other findings denote characteristics of academics that are not integrated in a community nor striving to attain a position of research leadership in a field or even at the university where they work. These findings are somewhat attuned with the results of Horta (2013), who stated that silver corded academics were not equals to homegrown academics but situating them in-between homegrown academics and mobile academics. It is possible that the findings concerning silver-corded academics portray a category that includes some silver-corded that are accomplished, competitive and dynamic as predicted by Caplow and McGee (1958) with other silver corded (in accordance with the concept) distinguished by different characteristics, research dynamics and preferences[13].

The results concerning the control variables are of interest, but only one is particularly selected to be discussed because of its pertinence to the analysis of this study. Education inbreeding once again demonstrates to have a different influence on the strategic research agendas of academics comparatively to the effects of immobility during the academic career. It correlates positively with ambitious (in terms of acquisition of prestige, which is contrary to the effect of academic inbreeding), multidisciplinary, and collaborative research agendas. In the case of the latter, from both the perspective of designing research agendas that are collaborative in nature and being invited into research agendas initiated by others. It is also relevant to note that the research agendas of female academics are less influenced by the PhD mentor, less likely to advance when there is a scarcity of research funds for a specific topic of interest, less oriented towards breakthrough research, less ambitious and focused on publishing, and less likely to be expanded to other fields of study or topics than the ones they are focused on. However, they are more multidisciplinary, attuned to the requirements of both field and institution strategic research goals, and also more aligned with societal needs. Although the findings concerning male and female academics on Table 4 did not find differences in aggregate terms considering gendered research agendas, the analysis by sub-dimensions in Table 5 suggest gendered forms of conceptualizing and engaging with research (findings that are aligned to a large extend with the findings by Ramos et al., 2015).

[TABLE 5 AROUND HERE]

Conclusion

This study tests and confirms Pelz and Andrew's (1966) assumptions that homegrown academics are less innovative, ambitious and adaptable than mobile academics, through an analysis of strategic research agendas of academics from all fields of knowledge, working in universities spread around the world. The findings show that homegrown academics research agendas are not designed with the potential to lead to scientific discovery (and research breakthroughs, which involves a greater risk-taking attitude) as the ones of mobile academics. The research agendas of homegrown academics are also less ambitious in the sense that these academics do not strategize them having in mind the potential that that research can bring in terms of acquiring greater recognition and academic prestige in broader scholarly communities comparatively to mobile academics. Finally, the research agendas of homegrown academics also reveal a preference for more disciplinary research ventures when compared to mobile academics, which although of relevance to the advance of disciplinary knowledge and frameworks is less attuned to the necessities confronting contemporary science and the complex challenges it faces, that tend to require multidisciplinary and interdisciplinary efforts (Bozeman and Corley, 2004).

The study did not confirm, however, some expectations concerning the influence of the PhD supervisor on the homegrown academic's formulation of their research agendas, contradicting the idea that there is a strong degree of conformity of these academics to the knowledge and research practices that the PhD supervisors may privilege, which are related also to the often reported overemphasis on local knowledge (see for example, Gokturk & Yildrim-Tasti, 2020; Vásquez-Cupeiro and Elston, 2006). This study has also not validated the expected alignment of homegrown academics' research agendas with the strategic research aims and objectives of the university where they work. This is surprising in the sense that studies on academic inbreeding tend to emphasize the behavioral and knowledge conformity of homegrown academics to senior academics and to organizational priorities and necessities (e.g, Shibayama and Kobayashi, 2017; Horta et al, 2011; Yamanoi 2005). A reason for these findings may rest with the not inclusion of institutional fixed factors in the analysis (which is a limitation of the study). It may be that homegrown academics working in universities with relatively low prevalence of academic inbreeding are not as influenced by the PhD mentor and less keen on aligning their research strategic preferences with those of the university. This may be different if the homegrown academics are developing their research in universities with high prevalence of academic inbreeding, where pressures to "be in line" with the PhD mentors and institutional strategic, symbolic and power dynamics and priorities is more stressed.

Finally, the study shows that silver-corded academics are a type of academics that should not be part of academic inbreeding, because their mobility history and research choices are not equal to those of homegrown academics. The findings of this study and those of Horta (2013) show that they are rather a group of academic's in-between homegrown academics and mobile academics. As argued in the analysis, they are likely constituted by academics with different abilities and the reasoning for their return mobility matters in understanding their research choices and proficiency. Due to their limited mobility (they only experience institutional mobility between two universities), they are possibly more similar to the group of academics that Dutton (1980) identified as adherents, that is, those that conclude their PhD at one

university, moved to work in other and remained there for their entire professional academic life.

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APPENDIX

Clustering was conducted employing the TwoStep Clustering algorithm with the auto-clustering feature (Zhang et al., 1996). Log-likelihood estimation was employed as Euclidean distance has been reported has exhibiting poor performance (Santos & Horta, 2015). Fit was evaluated through the average silhouette measure of cohesion and separation, which ranges from -1 and 1 – the current model exhibited a fit of 0.2, which is deemed acceptable (Kaufman & Rousseeuw, 2009). The choice of input variables for the model was based on the one used in previous research which identified the clusters of "Trailblazing" and "Cohesive" (Santos & Horta, 2018), and also including the two new variables of the MDRAI-R (Horta & Santos, 2020). Two clusters were extracted, which are summarized in the following table. Due to similarities with previous research (Santos & Horta, 2018), the names of "Trailblazing" and "Cohesive" were maintained. Table A1 includes descriptive statistics for the constituent variables of each cluster.

[TABLE A1 ABOUT HERE]

[TABLE A2 ABOUT HERE]

[TABLE A3 ABOUT HERE]

[TABLE A4 ABOUT HERE]

[TABLE A5 ABOUT HERE]

References for the appendix

Horta, H., & Santos, J. M. (2020). The Multidimensional Research Agendas Inventory—Revised (MDRAI-R): Factors shaping researchers' research agendas in all fields of knowledge. *Quantitative Science Studies*, *1*(1), 60–93. https://doi.org/10.1162/qss_a_00017

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[1] Methodological, conceptual, and even disciplinary differences have been identified as the main reasons explaining the mixed results on the relationship between academic inbreeding and research performance; see Alipova and Lovakov (2018).

[2] This may be stronger in academics who were also undergraduate students at the same university where they also obtained the PhD, then became homegrown academics (see Lovakov, 2016).

[3] Please note that we use the logarithm of age in the regression analysis to mitigate the influence of highly skewed values.

[4] This control variable is needed, given that homegrown/silver-corded academics are likely to be negatively correlated with top-ranked universities. Although we do not expect an endogenous relationship, because of simultaneity, we test our models after excluding this variable, and the results are not significantly affected.

[5]Our regression analysis uses all available information, reporting results on a variable number of observations depending on data availability. In Table A2 in the Appendix we report the descriptive statistics for the smaller sample used (5,594 observations in the "Mentor" model in Table 5), which shows very little change in the main statistics.

[6] Table A3 in the Appendix presents the distribution of academics by country (limited to countries with at least 100 researchers).

[7] The ordered logit model is a regression model for an ordinal response variable. The model is based on the cumulative probabilities of the response variable: in particular, the logit of each cumulative probability is assumed to be a linear function of the covariates, with regression coefficients remaining constant across response categories.

[8] In both stages of our analysis, we use robust standard errors to take into account the potential heteroskedasticity in our data. While we are aware that implementing robust standard errors may reduce the analytic power, our large sample size mitigates this concern (Zeileis, 2006).

[9] Please note that our tables report the estimation coefficients. To interpret the results, these coefficients are converted into estimates of average marginal effects, namely the average of effects, calculated for each individual, on the probability that a Trailblazing agenda is chosen.

[10] While Age and Time since PhD are included in our model for their distinct role, the two variables are naturally highly correlated, and their inclusion in our specification may raise multicollinearity concerns. Estimations of the variance inflation factor for all variables (excluding country dummies) identified a maximum value of 3.74, and an average value of 1.73, indicating a limited collinearity issue. Nevertheless, we exclude Time since PhD and repeat the estimates included in Table 4. We report these results in Table A4 of the Appendix.

[11] Please note that Table 5 reports the coefficients estimated in the ordered logit regressions. The standard interpretation of these coefficients is that for a one unit increase in the predictor, the response variable level is expected to change by its respective regression coefficient in the ordered log-odds scale. In the text, we estimate the increase in the average most-likely predicted class (on a 1–7 scale) due to the change in the regressor (e.g. homegrown academic with respect to a mobile academic).

[12] Not included in the article but can be provided upon request.

[13] A concern with our analysis relates to the potential self-selection of the sample, as homegrown and non-trailblazing academics may be jointly determined. We partially address this issue by estimating our models for two subsamples of academics from a country where homegrown academics are rare (the US) and one where academic inbreeding is relatively frequent (Italy). The results, reported in Table A5 in the Appendix, remain consistent for both subsamples, with stroner results in the subsample with more homegrown academics.

Tables

Sub-dimensions	Explanation
Scientific ambition: Prestige	The desire to acquire recognition and academic prestige in a given discipline and/or field.
Scientific ambition: Drive to Publish	Being driven by the publication of scientific articles.
Divergence: Branching out	Desire to expand into other fields of study or topics.
Divergence: Multidisciplinarity	Preference for working in multidisciplinary research ventures.
Discovery	Preference for working in fields or topics with the potential to lead to scientific discovery.
Tolerance to low funding	Willingness to work on fields or topics for which research funding is scarce.
Collaboration: Willing to Collaborate	Desire to engage in collaborative scientific ventures.
Collaboration: Invited to Collaborate	Having the opportunity and receiving invitations to participate in collaborative scientific ventures.
Mentor Influence	The academic's mentor (PhD or otherwise) holds a degree of influence over his or her work.
Academic driven: Field oriented	Extent to which the research agenda is influenced by scientific priorities that the field community determines by consensus.
Academic driven: Institution oriented	The academic propensity to align one's research agenda with the research strategic targets of their institution.
Society driven: Society oriented	The incidence of society related challenges in the research agenda.
Society Driven: Non-academic oriented	Measures the influence and participation of laymen and non-experts in the design of the research agenda.

Note: Adapted from Horta & Santos, 2020.

Table 1 - MDRAI-R sub-dimensions and their definition

Dimension	Definition
Organizational Commitment: Belonging	How much one identifies oneself with the department or Faculty.
Organizational Commitment: Willingness to Stay	One's willingness to stay in the organization.
Organizational Commitment: Satisfaction with the Leadership	How one perceives organizational leadership.
Resources	Perceived access to financial resources at the department or Faculty levels.
Social Satisfaction	Relates to the quality of co-worker interactions. An individual scoring high in this factor is happy to work with his colleagues and recognizes them to be competent, as well as recognizing the importance of such interactions.
Autonomy	Relates to the degree of independence an academic has. One with a high score in this factor can be said to have a greater freedom to conduct independent work.
Unconstraint	The lack of institutional pressure to conduct tasks and services unrelated to research.

Table 2: MDURWI dimensions and their definition

VARIABLES	Obs	Mean	StD	Min	Max
Dependent variables					
Trailblazing (dummy)	7,158	0.415	-	0.000	1.000
Mentor Influence	6,534	2.932	1.417	1.000	7.000
Tolerance to low funding	7,154	4.238	1.322	1.000	7.000
Discovery	7,158	5.048	0.911	1.000	7.000
Scientific ambition: Prestige	7,157	5.093	1.094	1.000	7.000
Scientific ambition: Drive to Publish	7,146	5.103	1.087	1.000	7.000
Divergence: Branching out	7,152	4.854	1.027	1.000	7.000
Divergence: Multidisciplinarity	7,149	5.251	1.142	1.000	7.000
Collaboration: Willing to Collaborate	7,157	5.493	0.915	1.000	7.000
Collaboration: Invited to Collaborate	7,154	4.876	1.028	1.000	7.000
Academic driven: Field oriented	7,147	4.040	1.157	1.000	7.000
Academic driven: Institution oriented	7,142	3.920	1.269	1.000	7.000
Society driven: Society oriented	7,134	4.500	1.332	1.000	7.000
Society Driven: Non-academic oriented	7,138	3.584	1.238	1.000	7.000
Independent variables					
Homegrown academics (dummy)	7,158	0.091	-	0.000	1.000
Silver-corded academics (dummy)	7,158	0.232	-	0.000	1.000
Female (dummy)	7,158	0.336	-	0.000	1.000
Age (years)	7,138	50.793	12.220	24.000	94.000
Time since PhD	6,168	18.523	12.517	0.000	71.000
Agricultural sciences (dummy)	7,158	0.037	-	0.000	1.000
Engineering and Technology (dummy)	7,158	0.206	-	0.000	1.000
Humanities (dummy)	7,158	0.031	-	0.000	1.000
Medical and Health sciences (dummy)	7,158	0.232	-	0.000	1.000
Natural sciences (dummy)	7,158	0.244	-	0.000	1.000
Social sciences (dummy)	7,158	0.251	-	0.000	1.000
Educational inbreeding (dummy)	7,158	0.530	-	0.000	1.000
Top ranked 500 university (dummy)	7,158	0.224	-	0.000	1.000
Leadership satisfaction	7,085	4.668	1.299	1.000	7.000
Belonging	7,108	4.953	1.140	1.000	7.000
Will to stay	7,062	4.757	1.356	1.000	7.000
Resources	7,146	3.484	1.262	1.000	7.000
Autonomy	7,141	5.536	1.023	1.000	7.000
Unconstraint	7,112	4.097	1.160	1.000	7.000
Social satisfaction	7,141	5.275	0.826	1.000	7.000

Table 3: Descriptive statistics

VARIABLES	Trailblazing Model 1	Trailblazing Model 2
Homegrown academics	-0.251**	-0.301***
	(0.098)	(0.102)
Silver-corded academics	-0.138**	-0.184**
	(0.069)	(0.074)
Female	-0.034	-0.029
	(0.060)	(0.064)
Age (ln)	-0.521**	-0.260
	(0.222)	(0.236)
Time since PhD	-0.005	-0.005
	(0.004)	(0.005)
Engineering and Technology	-0.142	-0.075
	(0.151)	(0.159)
Humanities	-0.129	-0.079
	(0.202)	(0.216)
Medical and Health sciences	-0.056	-0.063
	(0.151)	(0.159)
Natural sciences	-0.538***	-0.531***
	(0.150)	(0.158)
Social sciences	-0.183	-0.172
	(0.150)	(0.158)
Educational inbreeding	0.118**	0.117**
	(0.056)	(0.059)
Top ranked 500 university	-0.002	-0.061
	(0.076)	(0.081)
Leadership satisfaction		-0.032
		(0.032)
Belonging		0.067
		(0.041)
Will to stay		-0.164***
		(0.030)
Resources		0.142***
		(0.025)
Autonomy		0.166***
		(0.036)
Unconstraint		-0.224***
		(0.029)
Social satisfaction		0.789***
		(0.052)
Constant	2.478**	-2.617**
	(1.033)	(1.126)
Observations	6,081	5,969
Pseudo R-squared	0.037	0.104

Notes: The table reports unstandardized coefficients of Logit regressions, and robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1

Table 4 – Academic inbreeding and trailblazing research agendas

VARIABLES	Mentor	Ttlf	Discovery	Amb.prest.	Amb.pub	Div.branch.	Div.multi.	Collab.will	Collab.invite	Ac.field	Ac.inst	Soc.soc	Soc.nonac
Homegrown acad.	0.061	0.084	-0.099**	-0.082*	-0.004	0.012	-0.099*	-0.044	-0.064	-0.067	-0.066	0.060	0.034
	(0.060)	(0.056)	(0.040)	(0.050)	(0.047)	(0.046)	(0.052)	(0.039)	(0.044)	(0.049)	(0.049)	(0.053)	(0.052)
Silver-corded acad.	-0.118***	0.062	-0.046	-0.068*	-0.006	0.008	-0.017	0.029	-0.064**	0.007	-0.082**	0.021	-0.019
	(0.044)	(0.041)	(0.029)	(0.036)	(0.035)	(0.034)	(0.038)	(0.027)	(0.032)	(0.036)	(0.037)	(0.042)	(0.039)
Female	-0.153***	-0.150***	-0.047*	-0.060*	-0.075**	-0.161***	0.213***	0.022	-0.030	0.063**	0.200***	0.324***	-0.035
	(0.038)	(0.035)	(0.026)	(0.031)	(0.030)	(0.030)	(0.032)	(0.023)	(0.027)	(0.031)	(0.032)	(0.035)	(0.034)
Ln age	-0.514***	1.033***	0.206**	-0.743***	-0.999***	-0.238**	0.259**	-0.144	0.306***	0.144	0.007	0.861***	1.175***
	(0.149)	(0.135)	(0.095)	(0.117)	(0.115)	(0.111)	(0.118)	(0.089)	(0.101)	(0.119)	(0.117)	(0.126)	(0.128)
Time since PhD	-0.014***	-0.011***	0.003	0.012***	0.009***	-0.005**	-0.004*	0.001	0.007***	-0.010***	-0.010***	-0.016***	-0.022***
	(0.003)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)
Eng. and Technology	0.170*	0.332***	0.210***	-0.048	-0.166**	0.199***	0.054	-0.026	-0.146**	-0.196**	-0.224***	-0.257***	-0.152*
	(0.093)	(0.087)	(0.063)	(0.069)	(0.076)	(0.075)	(0.079)	(0.055)	(0.061)	(0.088)	(0.083)	(0.090)	(0.084)
Humanities	-0.020	1.024***	0.315***	-0.008	-0.010	0.179*	-0.143	-0.363***	-0.158*	-0.500***	-0.697***	-0.341***	-0.244**
	(0.125)	(0.120)	(0.089)	(0.104)	(0.101)	(0.102)	(0.110)	(0.091)	(0.095)	(0.112)	(0.115)	(0.130)	(0.117)
Medical/Health sci.	0.277***	0.177**	0.098	0.015	0.015	-0.009	0.040	0.123**	0.120**	-0.105	-0.168**	-0.304***	-0.283***
	(0.094)	(0.088)	(0.064)	(0.069)	(0.076)	(0.075)	(0.078)	(0.055)	(0.061)	(0.088)	(0.083)	(0.090)	(0.084)
Natural sciences	0.091	0.331***	0.092	-0.136**	-0.043	0.089	-0.242***	0.024	-0.062	-0.316***	-0.410***	-0.951***	-0.735***
	(0.092)	(0.086)	(0.064)	(0.069)	(0.075)	(0.074)	(0.078)	(0.054)	(0.061)	(0.087)	(0.083)	(0.090)	(0.083)
Social sciences	0.154*	0.674***	0.078	-0.053	0.031	0.026	-0.308***	-0.001	-0.046	-0.304***	-0.454***	0.037	-0.098
	(0.093)	(0.088)	(0.064)	(0.070)	(0.077)	(0.075)	(0.079)	(0.056)	(0.062)	(0.088)	(0.083)	(0.090)	(0.085)
Educ. inbreeding	0.022	0.044	0.038	0.065**	0.017	0.014	0.050*	0.036*	0.049*	-0.012	-0.046	-0.009	0.026
	(0.035)	(0.032)	(0.024)	(0.029)	(0.028)	(0.027)	(0.030)	(0.021)	(0.025)	(0.029)	(0.030)	(0.033)	(0.031)
Top ranked 500 univ.	-0.020	-0.092**	0.061*	-0.017	-0.015	0.013	0.002	0.012	0.006	-0.008	-0.058	-0.075	-0.137***
	(0.048)	(0.046)	(0.032)	(0.040)	(0.038)	(0.038)	(0.042)	(0.030)	(0.035)	(0.040)	(0.041)	(0.047)	(0.044)
Leadership satisf.	0.107***	-0.033*	-0.008	-0.025	-0.016	0.019	-0.017	-0.021*	-0.058***	0.038**	0.105***	0.016	0.027
	(0.020)	(0.018)	(0.013)	(0.017)	(0.015)	(0.015)	(0.017)	(0.012)	(0.014)	(0.016)	(0.017)	(0.019)	(0.018)
Belonging	-0.047*	-0.015	-0.018	0.044**	0.031	-0.004	-0.002	-0.022	0.049***	0.039*	0.151***	0.056**	0.008
	(0.025)	(0.023)	(0.017)	(0.021)	(0.021)	(0.020)	(0.022)	(0.015)	(0.019)	(0.021)	(0.022)	(0.025)	(0.023)
Will to stay	0.046**	0.011	-0.090***	-0.028*	-0.004	-0.086***	-0.082***	-0.023**	-0.052***	-0.000	-0.002	-0.052***	-0.035**
	(0.018)	(0.017)	(0.012)	(0.016)	(0.015)	(0.014)	(0.016)	(0.011)	(0.013)	(0.015)	(0.016)	(0.018)	(0.017)
Resources	0.092***	0.295***	0.050***	0.079***	0.013	0.026**	0.010	-0.004	0.158***	0.059***	0.074***	0.062***	0.112***
	(0.016)	(0.015)	(0.011)	(0.013)	(0.013)	(0.012)	(0.014)	(0.010)	(0.011)	(0.013)	(0.014)	(0.015)	(0.014)
Autonomy	-0.331***	0.178***	0.193***	0.060***	0.100***	0.034**	0.062***	0.027**	0.084***	-0.219***	-0.271***	-0.018	-0.143***
	(0.023)	(0.021)	(0.015)	(0.018)	(0.017)	(0.016)	(0.018)	(0.013)	(0.016)	(0.018)	(0.019)	(0.020)	(0.019)
Unconstraint	-0.096***	0.089***	-0.031**	-0.074***	-0.115***	-0.081***	-0.077***	-0.073***	-0.078***	-0.152***	-0.272***	-0.143***	-0.142***
	(0.018)	(0.017)	(0.012)	(0.015)	(0.014)	(0.014)	(0.015)	(0.011)	(0.013)	(0.015)	(0.016)	(0.017)	(0.016)
Social satisfaction	0.125***	-0.048*	0.176***	0.216***	0.172***	0.137***	0.321***	0.537***	0.432***	0.242***	0.151***	0.208***	0.153***
	(0.028)	(0.026)	(0.020)	(0.023)	(0.023)	(0.022)	(0.025)	(0.018)	(0.021)	(0.022)	(0.024)	(0.027)	(0.025)
Observations	5,594	6,035	6,038	6,038	6,037	6,033	6,030	6,037	6,035	6,028	6,030	6,019	6,025
Pseudo R-squared	0.041	0.040	0.029	0.032	0.038	0.048	0.045	0.059	0.056	0.037	0.042	0.041	0.031

Notes: The table reports unstandardized coefficients of Ordered Logit regressions, and robust standard errors in parantheses.
Constant cuts are not reported. Ttlf : “Tolerance to low funding”. *** p<0.01, ** p<0.05, * p<0.1 . *** p<0.01, ** p<0.05, * p<0.1.

Table 5 – Academic inbreeding and the sub-dimensions of strategic research agendas

Tables in the Appendix

	Cluster					
	1 - Trailblazing		2 - Cohesive		Combined	
Variable	M	SD	M	SD	M	SD
Mentor Influence	3.065	1.535	2.932	1.325	2.992	1.425
Tolerance to Low Funding	4.300	1.411	4.142	1.223	4.213	1.313
Discovery	5.490	0.835	4.643	0.806	5.024	0.921
Scientific Ambition (Prestige	5.598	0.972	4.626	0.996	5.063	1.098
Scientific Ambition (Drive to Publish)	5.526	1.001	4.660	1.008	5.049	1.094
Divergence (Branching Out)	5.350	0.925	4.478	0.935	4.870	1.027
Divergente (Multidisciplinarity)	5.924	0.868	4.670	0.992	5.234	1.127
Collaboration (Willing to Collaborate)	5.921	0.746	5.054	0.881	5.444	0.929
Collaboration (Invited to Collaborate)	5.356	0.895	4.391	0.911	4.825	1.024
Academia (Field-driven)	4.333	1.222	3.889	1.059	4.089	1.157
Academia (Institution-driven)	4.296	1.327	3.778	1.223	4.011	1.296
Society (Society)	5.111	1.151	4.002	1.234	4.501	1.318
Society (Non-academics)	4.049	1.252	3.353	1.123	3.666	1.233

Table A1: Descriptive statistics

VARIABLES	Obs	Mean	StD	Min	Max
Dependent variables					
Trailblazing (dummy)	5,594	0.463	-	0.000	1.000
Mentor Influence	5,594	2.897	1.402	1.000	7.000
Tolerance to low funding	5,594	4.237	1.327	1.000	7.000
Discovery	5,594	5.056	0.915	1.000	7.000
Scientific ambition: Prestige	5,594	5.104	1.095	1.000	7.000
Scientific ambition: Drive to Publish	5,594	5.132	1.063	1.000	7.000
Divergence: Branching out	5,594	4.879	1.019	1.000	7.000
Divergence: Multidisciplinarity	5,594	5.252	1.149	1.000	7.000
Collaboration: Willing to Collaborate	5,594	5.499	0.908	1.000	7.000
Collaboration: Invited to Collaborate	5,594	4.872	1.032	1.000	7.000
Academic driven: Field oriented	5,594	4.029	1.152	1.000	7.000
Academic driven: Institution oriented	5,594	3.910	1.270	1.000	7.000
Society driven: Society oriented	5,594	4.478	1.343	1.000	7.000
Society Driven: Non-academic oriented	5,594	3.556	1.249	1.000	7.000
Independent variables					
Homegrown academics (dummy)	5,594	0.093	-	0.000	1.000
Silver-corded academics (dummy)	5,594	0.247	-	0.000	1.000
Female (dummy)	5,594	0.332	-	0.000	1.000
Age (years)	5,594	50.241	11.890	24.000	94.000
Time since PhD	5,594	17.942	12.350	0.000	71.000
Agricultural sciences (dummy)	5,594	0.037	-	0.000	1.000
Engineering and Technology (dummy)	5,594	0.208	-	0.000	1.000
Humanities (dummy)	5,594	0.032	-	0.000	1.000
Medical and Health sciences (dummy)	5,594	0.207	-	0.000	1.000
Natural sciences (dummy)	5,594	0.260	-	0.000	1.000
Social sciences (dummy)	5,594	0.255	-	0.000	1.000
Educational inbreeding (dummy)	5,594	0.562	-	0.000	1.000
Top ranked 500 university (dummy)	5,594	0.228	-	0.000	1.000
Leadership satisfaction	5,594	4.681	1.303	1.000	7.000
Belonging	5,594	4.959	1.133	1.000	7.000
Will to stay	5,594	4.763	1.351	1.000	7.000
Resources	5,594	3.477	1.261	1.000	7.000
Autonomy	5,594	5.547	1.013	1.000	7.000
Unconstraint	5,594	4.090	1.153	1.000	7.000
Social satisfaction	5,594	5.273	0.828	1.000	7.000

Table A2: Descriptive statistics for the subsample of 5,594 observations included in all specifications

Country	Researchers	
	No.	% of sample
United States	1,352	18.89
Italy	460	6.43
United Kingdom	433	6.05
Spain	309	4.32
France	308	4.3
Brazil	299	4.18
Canada	292	4.08
Germany	272	3.8
Australia	258	3.6
India	210	2.93
Sweden	161	2.25
Netherlands	153	2.14
Portugal	148	2.07
China	126	1.76
Russia	117	1.63
Poland	103	1.44
Romania	100	1.4
Full sample	7,158	100

Table A3: Sample by countries (only countries with at least 100 researchers)

VARIABLES	Trailblazing Model 1	Trailblazing Model 2
Homegrown academics	-0.153**	-0.187**
	(0.071)	(0.086)
Silver-corded academics	-0.053	-0.093
	(0.065)	(0.069)
Female	-0.038	-0.040
	(0.055)	(0.059)
Age (ln)	-0.741***	-0.508***
	(0.107)	(0.119)
Engineering and Technology	-0.124	-0.090
	(0.139)	(0.147)
Humanities	-0.104	-0.070
	(0.189)	(0.202)
Medical and Health sciences	-0.099	-0.120
	(0.139)	(0.146)
Natural sciences	-0.494***	-0.514***
	(0.139)	(0.147)
Social sciences	-0.108	-0.107
	(0.139)	(0.147)
Educational inbreeding	0.211***	0.210***
	(0.052)	(0.055)
Top ranked 500 university	0.007	-0.051
	(0.071)	(0.075)
Leadership satisfaction		-0.041
		(0.029)
Belonging		0.069*
		(0.038)
Will to stay		-0.151***
		(0.028)
Resources		0.134***
		(0.023)
Autonomy		0.178***
		(0.034)
Unconstraint		-0.214***
		(0.027)
Social satisfaction		0.790***
		(0.048)
Constant	3.032**	-1.482
	(1.259)	(1.170)
Observations	7,072	6,940
Pseudo R-squared	0.036	0.103

Notes: The table reports unstandardized coefficients of Logit regressions, and robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1

Table A4 – Estimation of models in Table 4 when excluding Time since PhD

VARIABLES	US sample		Italy sample	
	Trailblazing Model 1	Trailblazing Model 2	Trailblazing Model 1	Trailblazing Model 2
Homegrown academics	-0.450**	-0.410*	-1.302**	-1.165**
	(0.202)	(0.216)	(0.586)	(0.555)
Silver-corded academics	-0.155	-0.112	-0.523	-0.541
	(0.132)	(0.142)	(0.471)	(0.500)
Female	0.027	-0.003	0.221	0.339
	(0.134)	(0.143)	(0.255)	(0.279)
Age (ln)	-0.079	0.239	-0.864	-0.052
	(0.580)	(0.636)	(1.057)	(1.160)
Time since PhD	-0.008	-0.010	0.005	-0.017
	(0.010)	(0.011)	(0.023)	(0.025)
Engineering and Technology	-0.153	0.005	-0.118	-0.239
	(0.445)	(0.454)	(0.559)	(0.602)
Humanities	-0.068	0.004	-0.028	-0.064
	(0.522)	(0.559)	(0.805)	(0.920)
Medical and Health sciences	-0.348	-0.425	0.432	0.275
	(0.406)	(0.415)	(0.569)	(0.609)
Natural sciences	-0.696*	-0.653	-0.820	-1.404**
	(0.409)	(0.417)	(0.588)	(0.627)
Social sciences	-0.451	-0.525	0.271	0.080
	(0.401)	(0.409)	(0.584)	(0.631)
Educational inbreeding	0.265**	0.333**	-0.187	-0.312
	(0.122)	(0.131)	(0.245)	(0.262)
Top ranked 500 university	0.196	0.076	0.090	0.279
	(0.125)	(0.134)	(0.854)	(0.845)
Leadership satisfaction		-0.023		-0.079
		(0.070)		(0.140)
Belonging		-0.012		0.212
		(0.095)		(0.165)
Will to stay		-0.258***		-0.073
		(0.071)		(0.127)
Resources		0.183***		0.185
		(0.054)		(0.123)
Autonomy		0.145*		0.015
		(0.085)		(0.147)
Unconstraint		-0.178***		-0.182
		(0.060)		(0.140)
Social satisfaction		1.051***		0.905***
		(0.130)		(0.223)
Constant	0.627	-5.599**	2.993	-4.556
	(2.154)	(2.461)	(3.823)	(4.432)
Observations	1,153	1,138	342	339
Pseudo R-squared	0.017	0.107	0.058	0.147

Notes: The table reports unstandardized coefficients of Logit regressions, and robust standard errors in parenthesis. *** p<0.01, ** p<0.05, * p<0.1

Table A5 – Academic inbreeding and trailblazing research agendas (separately estimated for US and Italy subsamples)