

International Postdocs and Academic Careers with Field-Specific Inequality and Institutional Prestige in South Korean Faculty Hiring

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Extended Abstract

Motivation. The postdoctoral period marks the first formal stage of an academic career, yet it is often characterized by precarity, stress, and structural ambiguity [1]. During this stage, researchers must produce high-impact work while navigating uncertain employment prospects [2]. These challenges are significant because the postdoctoral phase plays a critical role not only in academic retention but also in shaping the long-term trajectory of scientific careers [3]. While the prestige of PhD-granting institutions is a well-studied determinant of faculty hiring, one important indicator of academic career outcomes, the independent role of postdoctoral experience and its interaction with doctoral prestige remains under-explored. This study asks how postdoctoral trajectories vary across disciplines and the countries where faculty members obtained their PhDs, and whether these experiences provide differential advantages based on a researcher's doctoral background, focusing on faculty members in South Korea. Understanding these patterns helps reveal how early-career mobility and training pathways shape academic career opportunities.

Approach and Methodology. Research career structures prior to faculty appointments were analyzed using data from professors at South Korean universities with doctoral-granting authority, collected between 2022 and 2023. Publicly available sources, including Korean Researcher Information (KRI), official university websites, and personal homepages, served as the primary data outlets, with cross-verification conducted to ensure reliability. The dataset encompasses names, institutional affiliations, degree information (awarding institutions and years), and chronological records for each career stage, such as researcher, postdoctoral researcher, and professor. The scope was focused on Computer Science, Physics, and Biology—fields where postdoctoral training is established as a standard career milestone.

A postdoctoral researcher was defined as a scholar in an academic research position held between Ph.D. completion and the first faculty appointment. Individual career trajectories for each researcher i were formalized as a sequential transition sequence: $C(i) = [phd(i), C_1(i), C_2(i), \dots, C_{L_i}(i), hire(i)]$ comprising the doctoral-granting country, the country of each postdoctoral stage, and the final appointment status.

To investigate the relationship between doctoral origin and postdoctoral pathways, experiences were categorized into ‘KR only’ (all periods in Korea), ‘Int. only’ (all periods abroad), and ‘KR-Int. mix’ (a combination of domestic and international periods). To prevent the number of individual experiences from being applied disproportionately (rather than treating geographic mobility as a continuous variable), a normalization weight of 1 was distributed equally across the total number of countries for multi-national trajectories. Furthermore, to quantify the hierarchy of doctoral-granting institutions, the SpringRank

algorithm [4]—which estimates the latent social hierarchy of nodes within directed and asymmetric networks—was applied to determine the relative ranks of Ph.D.-granting and hiring institutions.

A rarity, which measures the low probability of a researcher’s subsequent career destination, was quantified for career trajectories using an n-gram language model with the context length set to 3 to encompass the Ph.D.-postdoc-appointment stages. It was derived by summing the log-probabilities of observed transitions—calculated based on the actual number of countries selected by the researcher relative to other existing paths.

To identify temporal shifts in recruitment criteria, the data was segmented into 10-year Ph.D. graduation cohorts, and trend-line regression analysis was performed to track changes in the proportion of faculty members with postdoctoral experience across these cohorts.

Results. Over the past decades, the share of faculty members with postdoctoral experience has increased substantially. Between 1980 and 2010, the proportion of postdoctoral training within professors’ career trajectories rose by 31.5–40.7 percentage points, while both the number and duration of postdoctoral appointments also increased. In physics and biology, average postdoctoral length grew by 1.13 and 1.73 years, respectively, indicating that the postdoctoral stage has shifted from a brief transition to a prolonged phase of academic careers.

Rarity increased linearly with the number of postdoctoral appointments and was strongly associated with the linearity of career sequences ($R^2 = 0.418\text{--}0.631$). The highest rarity values were observed among graduates of mid-tier PhD-granting institutions. However, rarity showed no positive correlation with the prestige of the final hiring institution. Instead, faculty hiring outcomes were driven more by the presence and location of postdoctoral experience—particularly whether it was domestic or international—than by the diversity of postdoctoral trajectories.

Conclusions and Outlook. Postdoctoral career trajectories are strongly shaped by researchers’ PhD backgrounds, revealing a persistent national and institutional hierarchy that emerges from the first postdoctoral appointment. Researchers from mid-tier PhD-granting institutions follow more complex and internationally diverse postdoctoral paths, reflected in higher rarity scores, yet this diversity provides no measurable advantage in faculty hiring outcomes. Instead, hiring outcomes are primarily associated with the quality and location of postdoctoral experience, with U.S.-based positions serving as the most influential signal. These findings indicate that international postdoctoral experience—particularly in the United States—functions as a key signal in academic hiring, reinforcing existing prestige hierarchies within Korean academia.

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