A Century of Faculty Globalization and University Rise: From US-Born, Foreign-Educated to Foreign-Born, US-Educated

Christian Chacua * Frank Neffke †

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Extended Abstract

American universities transformed from provincial institutions to global leaders in scientific research in less than a century (Geiger, 1986). A fundamental component of their success relied on their capacity to attract and employ talented researchers. We examine the educational backgrounds and career trajectories of multiple generations of leading U.S. scientists to understand the reliance of U.S. academic research institutions on foreign-educated and foreign-born faculty.

We digitized over 395k biographical entries, representing approximately 119k U.S. faculty, listed across twelve editions of the series "American Men and Women of Science" (Cattell, 1906; Kalte et al., 2005), published between 1906 and 2005. From this dataset, we identify U.S. faculty first hired by American universities between 1880 and 1990, tracking where they acquired their advanced research education and how they influenced their host institutions' research trajectories.

Our findings reveal that over a century, U.S. universities transitioned from relying on *U.S.-born, foreign-educated* to *foreign-born, U.S.-educated* faculty (see Figure 1). Until the early 1900s, approximately 25% of faculty hired in the U.S. were foreign-educated, predominantly German-educated, U.S.-born (see Figure 2). Over time, the share of foreign-educated faculty declined to 5% and in recent periods does not exceed 12%. Simultaneously, U.S. universities have become increasingly reliant on foreign-born scientists, whose share grew from approximately 5% in 1880 to over 25% by 1990. Notably, these foreign-born faculty were increasingly educated in U.S. institutions, with the share of *foreign-born, U.S.-educated* faculty rising from 5% in 1880 to around 20% by 1990.

*Growth Lab, Center for International Development - Harvard University, Cambridge, MA, United States
†Complexity Science Hub Viena, Viena, Austria

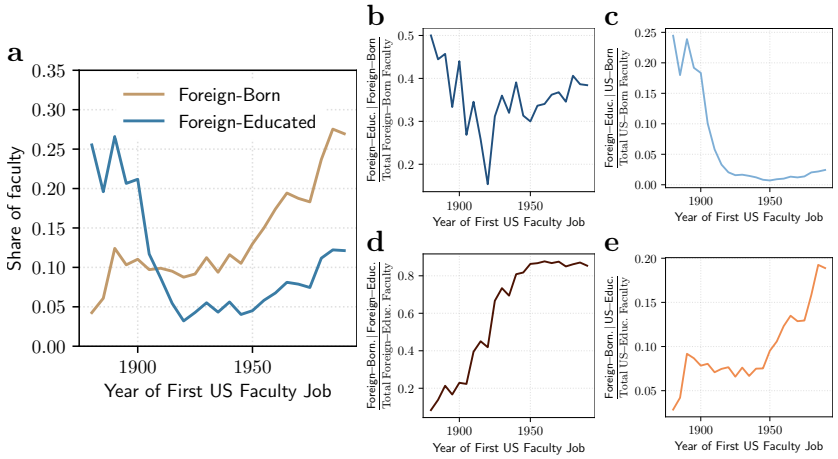


Figure 1: Foreign-Born and Foreign-Educated by Year of First US Faculty Job

Source: Own estimations using data from AMWS. **a**: Share of Foreign-Born and Foreign-Educated among the total faculty. **b**: Foreign-Educated among Foreign-Born faculty. **c**: Foreign-Educated among US-born faculty. **d**: Foreign-Born among Foreign-Educated faculty. **e**: Foreign-Born among US-Educated faculty.

Concerning the geographic sources of foreign education and foreign place of birth, we observed a general trend for U.S. universities to open to a more diversified and global pool of faculty. The geographic sources of foreign education diversified (see Figure 2), with the United Kingdom, Canada, and India becoming increasingly important as more countries appeared and Germany's influence declined. The origins of foreign-born faculty shifted from European and Canadian dominance in the late 1800s to greater representation from Asia, Europe, and other regions from the Global South (see Figure 3).

This shift was facilitated by U.S. universities' expanding networks of international partnerships, which provided access to foreign-educated scientists from diverse institutions worldwide. We document how different U.S. universities maintained distinct foreign partnerships. In 1906, MIT's primary source of foreign faculty was Leipzig, while the University of Missouri recruited heavily from Göttingen (see Figure 4). In recent periods, these networks have become denser and more diverse, with universities as a group drawing talent globally while maintaining preferential relationships with specific partners (see Figure 5).

We also examine the long-term impact of foreign education on university specialization and productivity in specific academic fields. We investigate whether the research publication profiles in particular academic fields where a scientist is educated correlate with the publication profile of a U.S. university many years later. We distinguish between *foreign-born foreign-educated* and *U.S.-born foreign-educated* scientists and find that both groups potentially influenced their host universities' research trajectories. However, for *foreign-born foreign-educated* faculty, these effects were larger and longer-lasting for earlier cohorts and diminished in recent periods, suggesting that early *foreign-born foreign-educated* faculty had a greater impact when U.S. universities were still developing their research capabilities. For *U.S.-born foreign-educated* scientists, effects were positive but smaller in magnitude and generally decreased over time as American institutions increasingly relied on domestically trained faculty.

Our work contributes to several literatures. First, it provides quantitative evidence for

debates about the emergence of U.S. academic research (Geiger, 1986; Cole, 2010; Kerr, 2001) and the historical formation of American research capabilities (Urquiola, 2020; MacLeod and Urquiola, 2021; Graham and Diamond, 2004; Cole, 2010). Second, it informs ongoing discussions about foreigners' contributions to U.S. science and innovation (Bernstein et al., 2022), particularly regarding migration and knowledge diffusion (Hornung, 2014; Lissoni, 2018; Ganguli, 2015) and migrants as agents of change (Hausmann and Neffke, 2019; Bahar and Rapoport, 2018; Bahar et al., 2020; Miguelez and Morrison, 2022). Third, it adds to research on U.S. faculty origins (Clauset et al., 2015; Burris, 2004; Jones and Sloan, 2020) and the U.S. academic elite (Yuret, 2017,0). Finally, it assembles a comprehensive geocoded dataset tracking leading American scientists' careers over more than a century.

Our findings are particularly relevant given current geopolitical debates about foreigners' roles in U.S. academic research. Our analysis suggests that when America was not yet a global academic leader, foreign education, primarily of U.S.-born scholars, helped the country acquire necessary scientific capabilities and establish conditions to benefit from later refugee influxes and mass immigration. Today, the U.S. relies on foreign-born talent to maintain innovation and its dominant position. While foreign-born scientists may not dramatically alter universities' publication profiles, they expand the talent pool and bring diverse global perspectives. Historically, Germany attracted the best U.S.-born scientists because German institutions led the world; today, America holds that advantageous position. Restricting this talent flow could impede U.S. research progress and directly benefit competitors.

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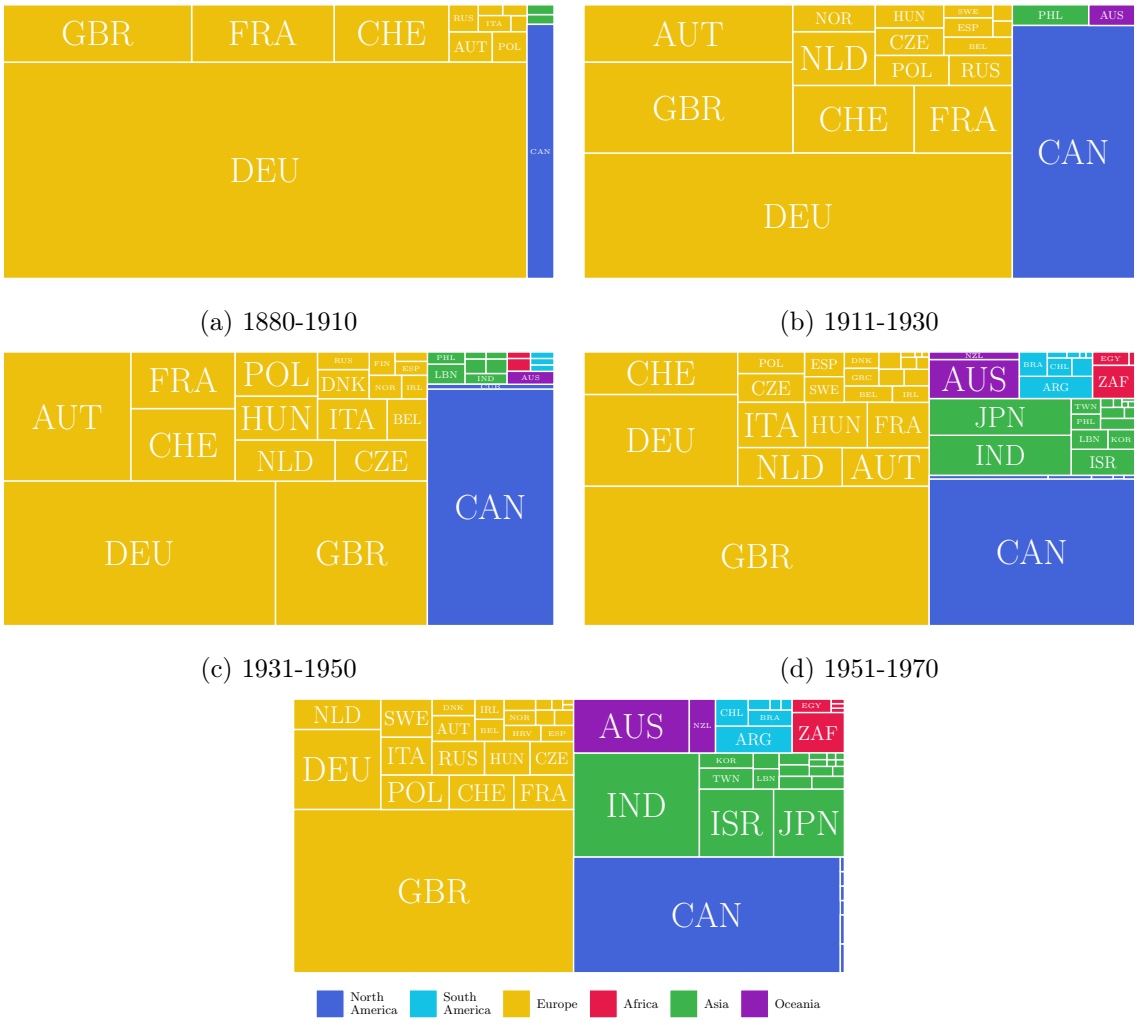
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Additional Figures



(a) 1880-1910

(b) 1911-1930

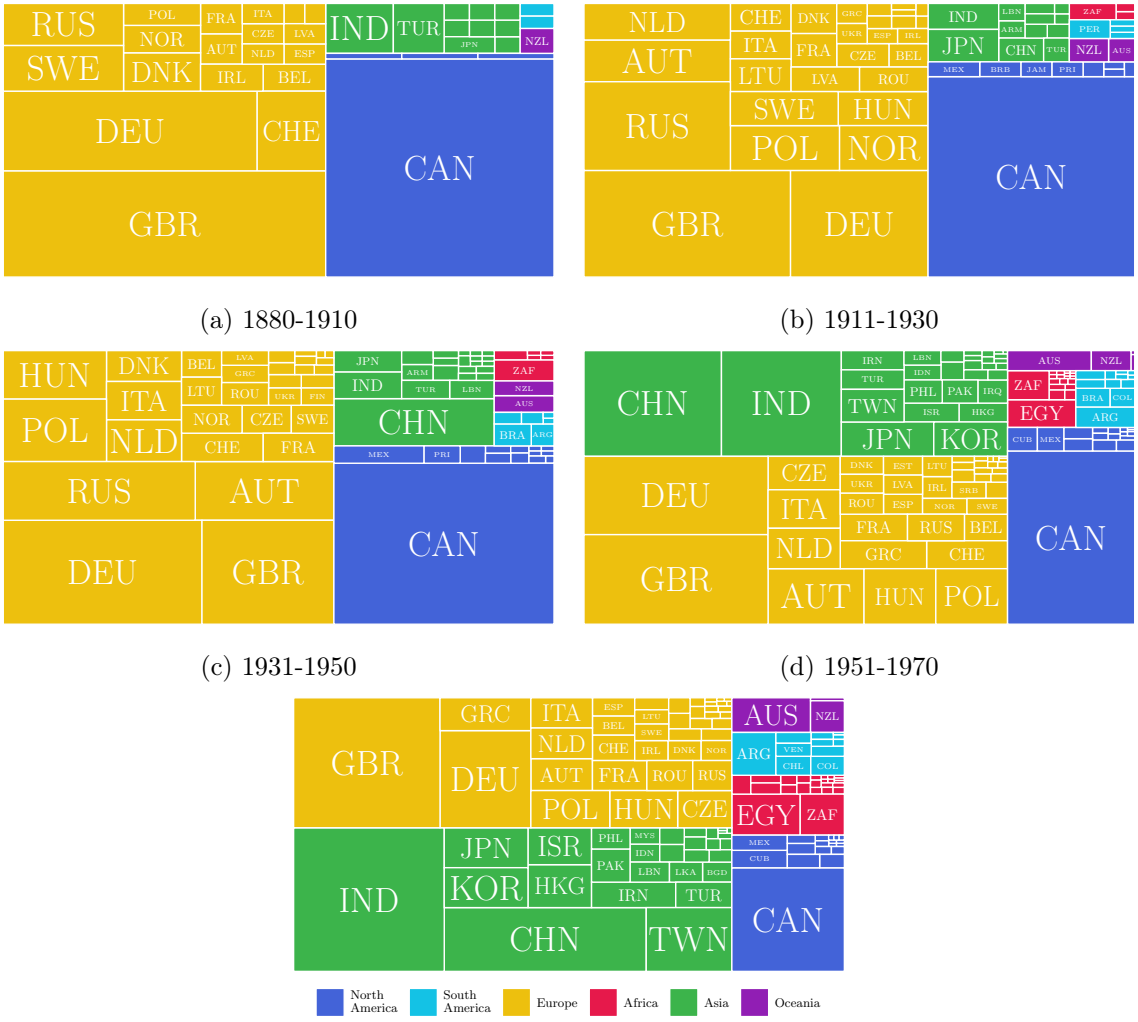
(c) 1931-1950

(d) 1951-1970

(e) 1971-1990

Figure 2: Education places of the foreign-educated

Source: Own estimations using data from AMWS. Year cohorts defined according to the year of first faculty job in the US.



(a) 1880-1910

(b) 1911-1930

(c) 1931-1950

(d) 1951-1970

(e) 1971-1990

Figure 3: Birthplaces of the foreign-born

Source: Own estimations using data from AMWS. Year cohorts defined according to the year of first faculty job in the US.

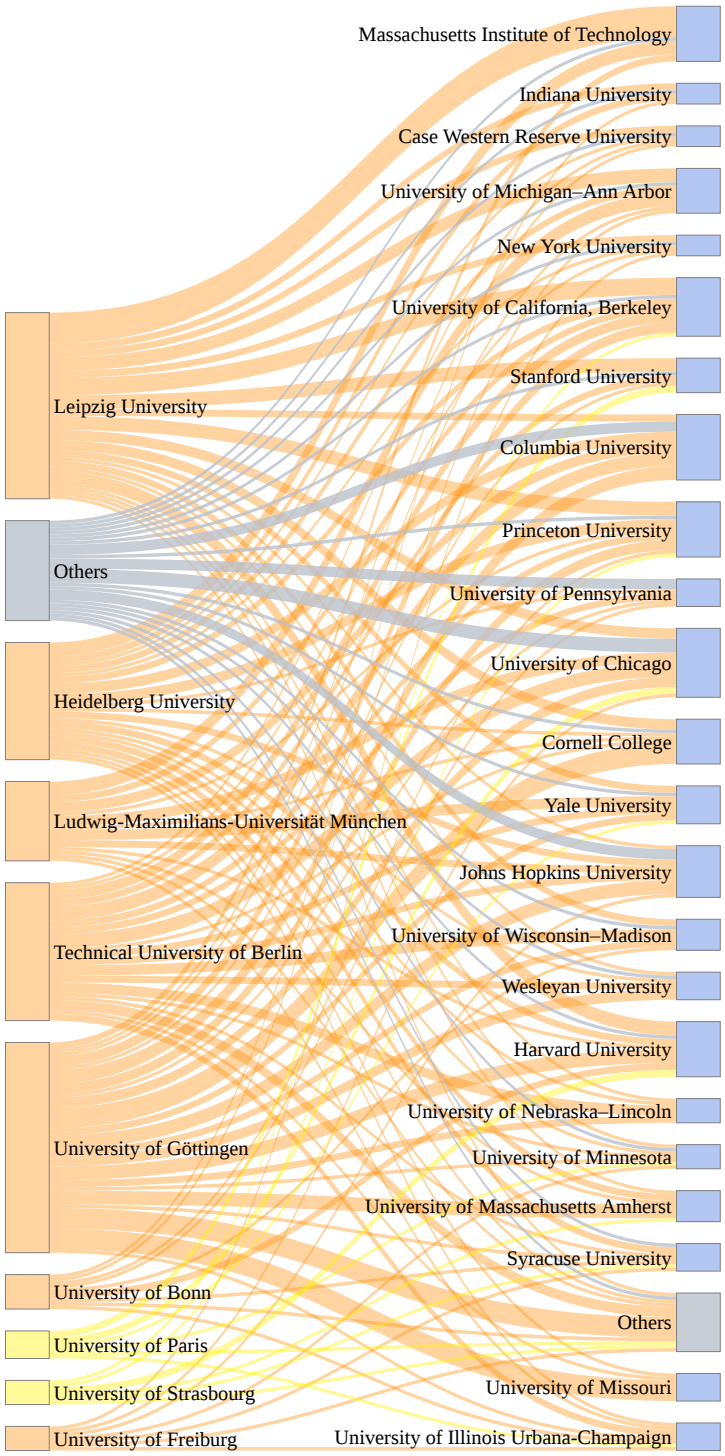


Figure 4: Main mobility corridors in 1880-1910

Source: Own estimations using data from AMWS. Note: Only the top 20% sending and receiving universities are shown, and the remaining universities are grouped in the category others. Links are colored according to the university of education (left side). Color palette: United States: blue; Germany: orange; France: yellow; other universities: gray.

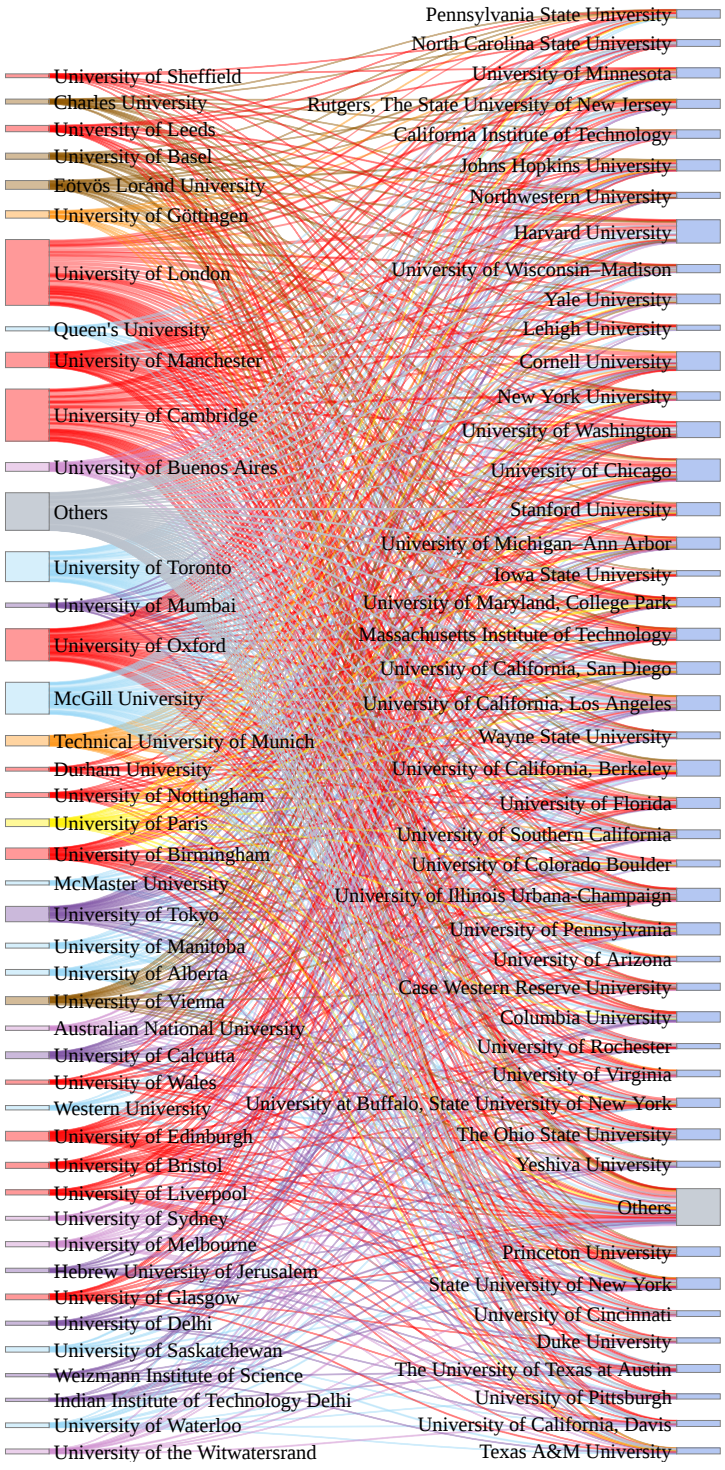


Figure 5: Main mobility corridors in 1971-1990

Source: Own estimations using data from AMWS. Note: Only the top 10% sending and receiving universities are shown, and the remaining universities are grouped in the category others. Links are colored according to the university of education (left side). Color palette: United States: blue; Germany: orange; United Kingdom: red; France: yellow; Rest of Europe: brown; Canada: light blue; Asia: purple; other universities: gray.